

EXPERIMENT STATION RECORD.

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ILLUSTRATION.

FIG. 1. Right- (R. H.) and left-handed (L. H.) stereo-isomeric seedlings. Page. 236

EXPERIMENT STATION RECORD.

XXVII.

ABSTRACT NUMBER.

No. 3.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Metabolic water: Its production and rôle in vital phenomena, S. M. BABCOCK (*Wisconsin Sta. Research Bul. 22, pp. 87-181*).—The author believes that sufficient distinction has not been made in plant and animal physiology between the function of water which is imbibed and that which is produced as a result of metabolism—oxidation, dehydration of carbohydrates, etc. The metabolic production of water is always associated with the absorption of free oxygen and an evolution of carbon dioxide, the latter being practically in the same ratio as the absorbed oxygen. The water so produced is in many instances essential to the life of the organism.

The results of some experiments with seeds (*Zea mays*), made for the purpose of determining the influence of drying upon germination, show that seeds which were dried for a considerable length of time lost in germinating power and showed weak sprout production, while those dried and immersed in hydrogen peroxid did not germinate at all.

The rate of respiration is within certain limits governed by the amount and distribution of water contained in the seed. The presence of carbon dioxide was found to retard germination somewhat, the retardation being proportional to the amount of oxygen present. Corn stored in an atmosphere of carbon dioxide in a sealed flask, for a period of 30 days, gave evidences of intra-molecular respiration (or anaerobic fermentation), and showed an increase of water from 29.66 to 33.94 per cent. None of this corn germinated when tested later.

Corn treated with solutions of glucose (3 per cent) showed a much higher percentage of germination than that treated with water alone. The embryo of seeds (corn) was found to absorb water more rapidly than the endosperm.

Germination tests conducted with hydrogen peroxid, in strengths from $\frac{1}{2}$ to 3 per cent, showed "that a very satisfactory method of making germination tests is to place the seeds between filter papers that are afterwards moistened with a $\frac{1}{2}$ per cent solution of hydrogen peroxid. In this way a large excess of the reagent is avoided and growth of parasitic organisms prevented. It is well in this case to renew the solution after 24 hours, the surplus liquid being poured off or absorbed by dry filter paper. In general, small seeds such as tobacco, timothy, clover, etc., have not germinated as readily with hydrogen peroxid as when water only was employed. Good results have been obtained with corn, wheat, rye, barley, buckwheat, peas, and beans either when immersed in the reagent or when placed between filter papers and moistened with it. Oats have not germinated well, by either method, unless the hulls were previously removed; when this was done oats germinated as well in hydrogen peroxid as

hydrogen peroxid than in water. This suggests that the method may serve the purpose of discriminating between doubtful and good seed."

The water content of sprouts, roots, and stems after separation from the embryo, 48 hours after germination, was found to range from 84.8 to 90.17 per cent (average 87.75 per cent). The moisture content of soaked grain was less than that of germinated grain, the most striking increase taking place in the embryo. The percentage increase in the germinated grain can not be all attributed to imbibed water, and in all probability is due to the production of metabolic water. In the case of mature plants, wilting is in part produced by the abstraction of water from the leaves, which is needed for the hydrolytic processes which are going on in the plant during sunshine.

Tubers and bulbs when stimulated to sprouting produce moisture as a result of dehydration and oxidation processes, to an amount much greater than was originally present in the tuber or bulb. The most water is present in the sprout. A similar process occurs in fruits. Immature seeds when exposed to the air for a time can be made to germinate. The lack of germinating power in the original seed as picked is due to the fact that certain necessary specific enzymes are not present. The theory of Naegeli in regard to the nature of inhibition in plants is criticised. "It seems far simpler to account for the phenomena of inhibition by a direct molecular combination of the substances composing the tissues of organized bodies and water, than by assuming the existence of micellæ, the structure and form of which can not be demonstrated."

Seeds when immersed in water generate a certain amount of heat which is due to the union of the starch with water. When sprouting begins it is due to the oxidation of sugar. "The final ripening changes in most fruits proceed fully as rapidly after removal from the tree as when left undisturbed. These changes are the result of direct respiration of living cells in the fruit which continue to function after the fruit is picked. The increase in succulence during ripening is partly due to the production of metabolic water through respiration and partly to the increased solubility of the products formed. It is not due to water derived from the parent plant. The water content is proportionately greater in ripe fruit than in green fruit, in spite of considerable loss of water through evaporation, even though the fruit be ripened off the tree."

With many animals the most of the water required in their metabolism is derived from the oxidation of organic nutrients. "Many varieties of insects and other animals that excrete the waste products of protein metabolism as salts of uric acid in solid form require no free water at any time, except the small amount present in air-dried food, the water content of which is usually less than 10 per cent. This is possible because the insoluble nature of uric acid renders it but slightly poisonous and permits of its excretion with a minimum loss of water. This is the case with the clothes moths, the grain weevils, the bee moth, and a large number of insects that live upon air-dried food throughout every stage of their development. The larvae of these insects contain from 5 to 10 times the amount of free water contained in their food. Some of these insects are capable of living long periods upon dry food in an atmosphere containing no moisture. No doubt they would live indefinitely upon dry food if this could be supplied without exposure to dry air which enormously increases the loss of water by evaporation."

Contribution to our knowledge of plant phosphatids, V. NERGOVAN (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1911), No. 1, pp. 1-26; *abstr. in Zentbl. Physiol.*, 25 (1911), No. 26, pp. 1222, 1223; *Zentbl. Expt. Med.*, 1 (1912), No. 2, p.

48).—By extracting the seeds of *Lupinus albus* a phosphate complex was obtained which consisted of a portion easily soluble in alcohol and a portion difficultly soluble. The latter has been previously investigated by Winterstein and Stegman (U. S. R., 23, p. 7).

Fractionations made with alcohol, ether, and acetone of the portion easily soluble in alcohol yielded 12 different fractions, of which 3 could be considered true phosphatids. The rest were more or less pure, but could not be considered definite carbohydrates, and in all probability were mixtures or compounds of carbohydrates and nitrogen-containing substances. The fractions soluble in acetone were found to contain phosphatids, odoriferous substances, lipochrome, and possibly stearin and fats.

The 3 phosphatids contained 3.46, 4.31, and 3.33 per cent of phosphorus, and 1.33, 1.56, and 1.46 per cent of nitrogen, respectively. The cleavage products contained stearin, palmitin, and unsaturated fatty acids, and 2 contained glycono-phosphoric acid. One of the preparations also contained an organic base which was not studied; another cholin; and another contained instead of cholin a base having the composition $C_8H_{11}N_2O_2$ and named "Vidin."

The localization of betain in plants, V. STANĚK (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 72 (1911), No. 5-6, pp. 402-409; *abs. in Jour. Chem. Soc. [London]*, 109 (1911), No. 537, II, pp. 818, 819).—Analyses were made of various parts of *Beta vulgaris saccharum*, *Triticum vulgare*, *Lycium barbarum*, *Atriplex canescens*, and *Amaranthus retroflexus*, by a method which is described. It was found that betalains are very irregularly located in the plant. A large amount of betain is present in the leaves during the early stage of growth, but gradually decreases as ripening sets in.

Young shoots are also rich in betain, while the bark and wood (*Lycium* and *Atriplex*) contain very little. The root and leaves of *Amaranthus* contain 0.48 and 2.16 per cent respectively, and those of the sugar beet 0.95 to 1.2 per cent and 2.62 per cent betain. The seeds of all the plants tested were strikingly poor in this compound. The whole of the analyses appear to indicate a localization of betain at points of energetic physiological activity. The high percentages found in young leaves, shoots, and the root of a biennial plant such as sugar beet lead to the conclusions that betain plays an important part in the nitrogen metabolism of plants, but does not serve as a reserve foodstuff."

Investigations in regard to the betalains occurring in plants, II, E. SCHULZE and G. TRIEB (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1912), No. 4, pp. 258-290).—Continuing the work previously noted (U. S. R., 26, p. 713), the authors find that sunflower seeds (*Helianthus annuus*) in the form of sunflower cake contain very little betain, about $\frac{1}{2}$ gm. of betain chlorid being obtained from 5 gm. of the cake. The leaves and stems of *H. tuberosus* yielded 1.5 gm. of betain chlorid from 6 gm. of material, while the bulbs gave 2 gm. of this salt from 25 gm. of material. The unripe seed coats of the vetch (*Vicia sativa*) yielded 1.33 gm. of betain chlorid from 488 gm. of dry substance, while the seed itself yielded from 100 gm. an average of 0.33 gm. of betain chlorid. Green vetch plants harvested before the blooming stage showed an average of 0.238 gm. of betain chlorid per 100 gm. of dry substance. The fresh green stems and leaves of peas (*Pisum sativum*) gave an average of 0.088 gm. of trigonellin per 100 gm. dry substance, as compared with 0.05 gm. of trigonellin from the seeds.

Black root (*Scorzonera hispanica*), the tubers of *Dahlia variabilis*, and chicory root (*Cichorium intybus*) all contained trigonellin, but the former two contained only very small amounts. From chicory root another base besides cholin was obtained, the amount, however, being so small that the product

could not be further studied. The leaves and stems of the young plants of *Stachys tuberosa* were found to contain stachydrin, which could be isolated very easily and in a pure state.

In addition to stachydrin, betonicin ($C_8H_{11}NO_2$), a new base (which is provisionally considered oxystachydrin by the authors) was isolated from the leaves and stems of *Betonica officinalis*. Trigonellin and betonidin were obtained from the leaves and stems during the blooming and ripening stage from *S. sylvatica*. *Salvia pratensis* yielded cholin, but no stachydrin or other betain could be found. Young leaves of *Citrus aurantium* yielded a much larger amount of stachydrin than old leaves.

The authors hold that betains are by-products of plant metabolism, which no longer take part in the physiological processes of the plant.

Some further contributions in regard to the occurrence of betains in the plant kingdom, K. YOSHIMURA and G. TRIER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 77 (1912), No. 4, pp. 290-302).—A continuation of the work noted above.

It is shown that no betain is present in *Glechoma hederacea* or *Fagopyrum esculentum*, but cholin was noted in the former. Stachydrin was isolated from the leaves and stems of *Galeopsis grandiflora* (in the optically inactive form, which is the first time it has been noted), and in lemon peel, but not in the leaves and stems of *Ajuga reptans* and rosemary flowers. Cholin was present in the latter 2 plants. Stachydrin and cholin were also detected in the flowers of *Chrysanthemum cinerariifolium*, while trigonellin was detected in the leaves and stems of *Mirabilis jalapa*.

Micro-organisms and fermentation, A. ØRGENSEN (London, 1911, 4. ed. rev., pp. XI+489, figs. 101).—This is the fourth revised English edition of this work, which deals with the physiology of fermentation. Among the topics discussed are the microscopical and physiological examination of material; biological examination of air and water; the various sorts of bacteria, molds, and yeasts, especially those of importance industrially; theories of fermentation; the action of yeasts; and the pure culture of yeast on a large scale.

Silage fermentation, W. M. ESTEN and C. J. MASON (*Connecticut Exptl. Sta. Bul.* 70, pp. 40, figs. 3).—This investigation considers particularly the symbiotic fermentation which occurs during the preparation of silage with a view of determining the best conditions for preparing silage.

From some tests made in experimental silos (2-qt. milk bottles filled tightly with corn ground in a meat chopper and sealed), kept at temperatures of 40, 50, and 70° F., it appears that the latter temperature is the best one for producing preservative qualities, while at 40° the most destructive fermentation takes place. The temperature of 50° favors the production of propionic and butyric acids.

"This experiment explains why silage does not keep as well in cement, stone, or brick silos. The cement, stone, and brick conduct away the heat generated in a silo and the acid fermentation is checked unless the temperature of the air at siloing time is warmer than normal." According to this the appearance of the silage is not always the complete criterion for judging the quality of silage. Chemical and odor tests must be made in order to get a good idea of the quality.

The acidity of silage (chiefly lactic and acetic acids) was found to be in 5 years' testing nearly always 1 per cent (80 being the molecular weight considered in the determinations) for the total weight of silage, although at times it was over 2 per cent. The average is probably 1.5 per cent. In the miscellaneous examinations of the silage juice it is shown that at least 7 distinct varieties of yeast were present, all of which were facultative anaerobes. Among 13 colonies picked out from plates 10 were capable of fermenting dextrose, 3 fermenting dextrose and saccharose only, and 3 fermenting none of the 3

Acetic acid was found to be present in the fermented silage. Alcohol, acetic acid was produced in the silage the author was at a loss to explain why this acid is produced from the alcohol when an abundance of oxygen was not present.

Observations of the temperature of silage for a period of 5 years showed the highest temperature at the surface to be 126°. The highest interior temperature, taken 5 ft. from the bottom and from 1 to 2½ ft. from the edge, was 86°. "The highest temperatures [were] 6 in. from the surface. More than 3 ft. from the surface no temperature above 82.40 has been observed during the 5 years of observations on silage fermentations of all silos examined. High temperatures near silage destruction when they are above 100°, and not silage formation. The best temperature for silage fermentation is from 75 to 85° F. because when these temperatures are found in a silo the best silage is found. At this temperature the acid is produced most rapidly and stops the growth of undesirable bacteria much sooner than at 65 to 70°. At a temperature below 65° during the fermentation stage a poor quality of silage is produced." The course of the bacterial growth and temperature curves of the silage were nearly parallel.

The number of acid-producing bacteria, of which the author makes 3 divisions, according to their fermentability, varied with the different years. A cane-sugar medium was found to be better than a lactose medium for differentiating acid from nonacid-producing bacteria. The methods of sampling silage and plating for bacterial counts are given.

As a conclusion the author points out the following: "Any farm product can be silaged providing there is sufficient sugar in the mixture to be fermented into acid to preserve it. The following mixtures silo successfully and make a very desirable and nearly balanced ration: Alfalfa and rye, clover and timothy or wheat or oats, oats and peas, and corn and cowpeas or soy beans. A round wooden stave silo, taking all things into consideration, has proven most satisfactory." A bibliography is appended.

Agricultural chemistry, R. ORTO (*Grundzüge der Agrilkulturchemie*. Berlin, 1911, 2. ed. rev., pp. VIII+302, figs. 42).—A second edition, revised and enlarged (E. S. R., 10, p. 715).

Chemical-technical methods of analysis, edited by G. LUNGE and E. BERL (*Chemisch-technische Untersuchungsmethoden*. Berlin, 1911, 6. ed., rev. and enl., vols. 3, pp. XXI+1023, figs. 150; 4, pp. XIX+1061, pls. 4, figs. 56).—These volumes deal with general and special methods for analyzing fertilizers, feeding stuffs, gases, the products of gas manufacture, mineral oils, lubricating materials, fats and waxes, resins, balsams and gum resins, rubber, essential oils, the materials and products of cane and beet-sugar manufacture, starch, dextrin, alcohol, wine, vinegar, beer, paper, leather, citric acid, coal-tar dyes, and textile fibers.

Theory and practice of volumetric analysis, A. CLASSEN (*Theorie und Praxis der Massanalyse*. Leipzig, 1912, pp. IX+772, figs. 46).—This work, chiefly based upon the results obtained in the inorganic and electrochemical laboratory of the technical high school at Aachen, deals with indicators, measuring apparatus, titrimetric systems, methods for saturation analysis, acidimetric methods, oxidation and reduction methods, iodometry, and analysis by precipitation.

Note on the neutral permanganate method for the availability of organic nitrogen, J. P. STUART (*Abstr. in Science*, n. ser., 35 (1912), No. 398, p. 427).—Adding 1 gm. of sodium carbonate to the neutral permanganate solution, just before adding the material to be examined, overcomes much of the loss in availability which occurs when high-grade ammoniates are mixed with large amounts of acid phosphate.

"Results on many organic ammoniates in presence of acid phosphates are given, showing that the method does differentiate between high and low grade materials."

Activity of organic nitrogen as measured by the alkaline permanganate method, C. H. JONES (*Abs. in Science, n. ser.*, 35 (1912), No. 868, pp. 426, 427).—After giving a detailed description of the alkaline permanganate method and the form now used for reporting the results, the author reports results on 14 different crude nitrogenous stock samples, 8 commercial fertilizers, and 13 mixtures of known composition, and interprets them from a standpoint of nitrogen activity.

"A method is also presented for determining the percentage of nitrogen in the organic and volatile matter." Its application to fertilizers and crude stock as a means of determining whether the organic nitrogen present came from materials rich or poor in that element is discussed."

A method for determining phosphoric anhydride colorimetrically, N. PASERINI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 1, pp. 5-10).—Previously noted from another source (*E. S. R.*, 25, p. 614).

A rapid volumetric method for the estimation of free sulphur, C. DAVIS and J. L. FOUCAR (*Jour. Soc. Chem. Indus.*, 31 (1912), No. 3, p. 190).—The method is as follows:

"One gm. of the finely ground (60 mesh) sample (or its equivalent if previously dried) is dried in the water bath for an hour (if not already dried) and then transferred to a 250-cc. flask; 1.5 gm. of sodium cyanide and 50 cc. of absolute alcohol are added, and the contents are boiled under a reflux condenser for 2 hours. The alcohol is then completely removed by distillation, 100 cc. of hot water added, and the solution washed into a 250-cc. flask. The volume is made up to the mark—in the cold. To 25 cc. of this solution 75 cc. of water and 5 cc. of saturated iron alum solution are added; this is heated with constant stirring to 95° C., filtered into a 750-cc. beaker, and washed free from thiocyanate. When cool, 5 cc. of nitric acid is added, the solution made up, if necessary, to about 500 cc. with water, and titrated with twentieth-normal silver nitrate solution until the red color of the ferric thiocyanate completely disappears, or an excess of silver nitrate may be added and the solution titrated back with twentieth-normal thiocyanate. Should the sample contain thiocyanate, as is most likely in the case of spent oxid, a blank test should be conducted, the thiocyanate being extracted with water.

"Should it be required to ascertain the amount of matter, other than sulphur, soluble in carbon bisulphid, it may be determined by subtracting the sulphur content, found as above, from the figure obtained in the usual way for the percentage soluble in carbon bisulphid."

Detection of fluorids, E. RUPP (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 22 (1911), No. 9, pp. 496, 497, fig. 1; *abs. in Analyst*, 37 (1912), No. 430, p. 32).—The substance to be tested is converted into ash and moistened in a platinum or lead crucible with 3 drops of water and 1 cc. of sulphuric acid. The crucible is then pitted loosely with a rubber stopper, through which a piece of glass rod passes. The lower end of the glass rod is moistened with a drop of water and the crucible with its contents heated for about 20 minutes.

If fluorids are present the rod becomes coated with a film consisting of silicon sodium silicofluorid, and calcium silicofluorid. If only traces of fluorid are suspected the portion of the glass rod below the stopper may be covered with a piece of rubber tubing, leaving only the end exposed to the action of the vapors.

Work published in regard to the composition, analysis, and adulteration of foods, A. J. J. VANDEVELDE (*Répert. Internat. Comp., Anal. et falsif. Denrées Aliment.*, 10 (1909), pp. 104).—This is a bibliography, which in some instances

...the following topics: Foods and methods of food analysis, cereals, water, milk and cream, fats and oils, cheese, flour and its derivatives, spices, sugars, beverages, legumes, fruits, meats, eggs, food adulterations, food legislation, etc.

Compendium for food chemists, A. BUJARD and E. BAIER (*Hilfsbuch für Lebensmittelchemiker*, Berlin, 1911; 3. ed., rev., pp. XVIII+730, figs. 10).—This publication (E. S. R., 12, p. 878) has been enlarged and brought up to date.

Netherlands food codex, A. J. J. VANDEVELDE (*Rev. Gén. Chim.*, 14 (1911), Nos. 17, pp. 289-277; 18, pp. 291-297).—A description of the official methods, chemical, microscopical, and physical, for the examination of the various flours and breads.

The valuation of edible fats by color reactions, H. SERGER (*Chem. Ztg.*, 35 (1911), Nos. 85, pp. 581, 582; 67, pp. 602, 603; 68, pp. 610-612).—This is a discussion in regard to the various color reactions thus far proposed for detecting adulterations in the edible fats. It is divided into a general part, which considers the Welman, Bellier, Serger, Kreiss, and Wiedmann reactions, and a special part, which deals with specific reactions and considers cotton-seed oil (the Halphen, Becchi, and Hauchecorn reactions), olive oil, lemon oil, palm oil, coconut oil, peanut oil, and sesame oil. The reaction of sesame oil in butter has already been noted (E. S. R., 26, p. 212).

Examination of diseased potatoes with Reimann's potato balance, S. HALS (*Tidsskr. Norske Landbr.*, 18 (1911), p. 183; *abs. in Chem. Ztg.*, 35 (1911), No. 51, *Report*, p. 384).—Eighteen samples of potatoes which were affected with rot showed an average of 2.4 per cent less dry substance when determined by Reimann's balance than the figures obtained by the usual gravimetric method. The starch content in 9 out of 10 cases also showed 3 per cent less with the Reimann apparatus. These differences are probably due to the fact that the brown portions of the diseased potato contain proportionately less starch and more air spaces, so that their buoyancy in water becomes greater.

An electrical conductivity test for purity of maple sirup, J. F. SNELL (*Abstr. in Science, n. ser.*, 35 (1912), No. 897, p. 379).—The method consists of diluting the sirup with 2 volumes of water and determining its electrical conductivity with the usual Wheatstone bridge and telephone receiver.

Among 57 sirups coming from Quebec, Vermont, and Ontario only 2 samples which were not obtained from the market gave conductivity figures under 200. The smallest value found was 110. Genuine sirups from the United States may be expected to give figures varying from 100 to 200, and Canadian sirups from 120 to 200.

Official methods for the examination of chocolate and cocoa (*Ann. Falsif.*, 4 (1911), No. 64, pp. 417-427, figs. 5).—These are the official French methods for determining water, ash, fat, sugar, matter insoluble in water, and starch in ordinary chocolates and cocoas, and the ash, casein, saccharose, lactose, etc., in milk chocolate. Some microscopic methods are included.

Detection of caramel in fermented beverages, V. PASQUERO and A. CAPPA (*Gaz. Chim. Ital.*, 41 (1911), II, No. 3, pp. 349-358; *abs. in Analyst*, 37 (1912), No. 430, p. 18).—The method rests on the fact that furfural can be obtained when caramel is subjected to distillation. The test is conducted as follows:

The beer, or other beverage suspected of containing caramel, is first neutralized with magnesium carbonate, and 100 cc. is distilled (after adding a few pieces of pumice stone) until a bulk of distillate corresponding to 75 cc. is obtained. The distillate is then made up to 100 cc., and 20 cc. shaken with 2 cc. of glacial acetic acid and 5 drops of colorless anilin in a colorimetric tube. If caramel is present a red color is produced within 15 minutes.

Analysis of candied lemon peel. E. HÄRTZ and A. KINAST. *Untersuch. Nahr. u. Genussmit.*, 22 (1911), No. 6, pp. 339-353, 342, 343, 345, 37 (1912), No. 430, pp. 20, 21.—Twenty samples of candied lemon peel were examined with the following results: "Insoluble substances, 2.88 to 5.23 per cent; soluble extractives, 60.83 to 79.22 per cent; acidity (as acetic acid), 0.04 to 0.2 per cent; sucrose, 14.3 to 48.5 per cent; starch, syrup (alcoholsoluble), 9.45 to 25.3 per cent; ash, 0.37 to 3.09 per cent; sodium chloride, 0.02 to 0.69 per cent.

The process of manufacturing candied lemon peel is described.

Technical drug studies by the division of drugs. (*U. S. Dept. Agr. Bur. Chem. Bul.* 150, pp. 51).—The following studies are included in this publication: Examination of Hydrogen Dioxid Solutions, by L. F. Kebler, L. E. Warren, and E. A. Ruddiman (pp. 5-23); The Purity of Glycerin, by L. F. Kebler and H. C. Fuller (pp. 24-35); Notes on Two Important Alkaloidal Reactions, by H. C. Fuller (pp. 36-40); The Separation and Identification of Small Quantities of Cocain, by H. C. Fuller (pp. 41-44); The Determination of Molybdic Trioxid, by B. Herstela (pp. 44-46); A Method for Testing Ammonium Salts, by B. Herstein (pp. 47, 48); Character of Samples of Beeswax Submitted with Bids, by L. F. Kebler and F. M. Boyles (pp. 49-51).

Biochemistry of colostrum. S. ENGEL (*Ergeb. Physiol.*, 11 (1911), pp. 41-105, figs. 8).—This is a critical review of practically all the work done in regard to the biochemistry of colostrum. It includes the colostrum of the cow, buffalo, goat, sheep, horse, and man.

Investigations in regard to the hemolytic power of cow's colostrum, W. KÖBBLE (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 61 (1912), No. 7, pp. 561-589).—The colostrum from some cows contains hemolytic amboceptor and complement. Hemolytic amboceptor is present the second day post partum. Indications for complement were noted up to the fifth day, but most often only to the third day.

According to this author, the hemolytic amboceptors and complement in colostrum are nothing else than constituents of the normal bovine serum which have filtered through the blood vessels into the mammary gland. These bodies are present in both the initial and end colostrum, and in practically the same amounts.

Note on the gravimetric estimation of phosphorus in milk. E. H. MILLER (*Analyst*, 36 (1911), No. 429, pp. 579-583).—"The conclusions drawn from the results are that the usual methods of estimating phosphorus in milk—viz, (1) By precipitating as magnesium ammonium phosphate after removing the lime as oxalate, and weighing as magnesium pyrophosphate; (2) by precipitating as magnesium ammonium phosphate in the presence of lime, holding the same in solution with ammonium citrate, and weighing as magnesium pyrophosphate; and (3) by precipitating as ammonium phosphomolybdate, dissolving and reprecipitating as magnesium ammonium phosphate, and weighing as magnesium pyrophosphate—give results that differ from Carius's method only by about 0.01 per cent. In the case of concentrated and sweetened condensed milk and milk powders it is evident, however, that it is preferable to treat the milk solids by Carius's method, and estimate the orthophosphoric acid in the solutions so obtained. It might be mentioned that the close agreement between the results seems to show that no appreciable quantity of phosphorus is volatilized during the incineration of the milk. This has also been pointed out by Bordes and Touplain" (*E. S. R.*, 25, p. 713).

Comparison of methods of sampling cream for testing. C. E. LEE and N. W. HEPBURN (*Illinois Sta. Bul.* 153, pp. 543-574).—The purpose of this investigation

was principally to determine the efficiency of the various methods of sampling in fact and their relation to actual creamery practice.

The kinds of samples taken were individual, ordinary composite (obtaining a sample consisting of a representative amount of cream from each delivery of a single patron for 15 days), and proportionate (samples taken in proportion to the amount of cream received at the creamery). For the whole experiment 40 per cent 18-oz. bottles, graduated to $\frac{1}{2}$ per cent, were used. The samples were weighed on a scale of the creamery torsion type.

The duplicates obtained when testing the cream by the same or different testers were only reasonably variable. "In samples reported 87.7 per cent were exact duplicates or checked within $\frac{1}{2}$ per cent, 9.8 per cent varied 1 per cent from the individual, while 2 $\frac{1}{2}$ per cent showed a variation of more than 1 per cent." A greater latitude of variation between composite and individual samples was noted than between 2 sets of composites. The variation, however, was evenly divided. The composites of one of the authors (Hepburn) showed tests of 36.4 per cent above and 41.99 per cent below the individual samples.

Two series of composites taken in the same manner showed the following tendency for variation: 63.73 per cent were exact duplicates, or varied but $\frac{1}{2}$ per cent; 17.6 per cent varied 1 per cent; 6.33 per cent varied 1.5 per cent; 7.52 varied 2 per cent; 2.1 per cent varied 2.5 per cent; while 2.8 per cent varied more than 2.5 per cent. During the winter months 41.87 per cent of the composites tested lower than the individual against 35.38 per cent testing higher. During the summer months 33.91 per cent tested lower against 43.16 testing higher.

The results of long-time averages, that is, during a period of 6 months, show that one of the testers (Lee) had only 15.7 per cent of the samples vary more than $\frac{1}{2}$ per cent, while with the other tester (Hepburn) the variation was 15.9 per cent. "Under the proportionate system, for a period of 6 months, 24.75 per cent of the samples varied more than $\frac{1}{2}$ per cent." When based on the period of 1 year "only 5.95 per cent of Lee samples varied more than $\frac{1}{2}$ per cent, while during the same length of time 7.78 per cent of Hepburn's varied more than $\frac{1}{2}$ per cent." Results from the yearly average butter fat show 14.52 per cent of composites below the individual and 7.7 above by Lee, and by Hepburn 15.34 per cent below and 7.78 above. These results are closer than the results obtained by duplicate testing."

All of the above results were corroborated from the total weights of butter fat, which showed that the variation between the individual and composite samples was 0.27 (Lee samples) and 0.16 (Hepburn samples) per cent. According to these findings, reasonable allowances should be made for the differences in duplicate samples obtained by the same or different testers.

The aldehyde figure of butter, E. H. MILLER (*Analyst*, 37 (1912), No. 431, pp. 50, 51).—Formaldehyde combines with milk proteins to form additive com-

pounds, probably of the type $R-\overset{\text{NCH}_3}{\underset{\text{COOH}}{\text{C}}}$, which increase the acidity of the

milk or cream in proportion to the total nitrogen present. This fact has been employed successfully by Richmond (E. S. R., 18, p. 8; 22, p. 309) for estimating the proteins in milk, and the author sought to apply it to the protein content of butter. The results obtained with butter 1 month old show that it can be employed for this purpose.

The method used in the investigation was as follows: "Approximately 10 gm. of butter is weighed into a tared beaker, which is placed in a water bath at 60 to 70° C., until the butter is completely melted. Twenty-five cc. of water at about 65° is added, and followed by 1 cc. of a 0.5 per cent solution of phenolphthalein. The contents are well agitated. Approximately twentieth-

normal alkali is then run in until a faint permanent pink tint is obtained. If it is found that the end point is masked by the yellow color of the ether fat, the contents of the beaker should be allowed to settle, and the bottom aqueous layer observed, and the addition of alkali continued until the pink tint is obtained. Five cc. of strong formaldehyde solution is then added, and the contents of the beaker well agitated; twentieth-normal strontia is then run in until the pink tint is again produced in the aqueous portion.

"The number of cubic centimeters of twentieth-normal alkali used in the second titration, less the amount equivalent to the acidity of the formaldehyde solution added, is proportional to the protein present. One cc. of twentieth-normal strontia is equivalent to 0.01355 gm. of protein nitrogen, assuming the proportion of casein to albumin to be 7:1."

Procedure for determining the sugar content of bagasse, J. J. HAZZWINKEL, J. S. DEHAAN, and G. L. VAN WELIE (*Arch. Suikerindus. Nederland. Indië*, 19 (1911), No. 49, pp. 1687-1691; *Meded. Proefstat. Java-Suikerindus.*, 1911, No. 13, pp. 381-385; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 3, pp. 142, 143).—This is a method based on the fact that proper results can only be obtained if the basic lead acetate solution is added after boiling. Defecation before boiling yields higher results.

In regard to the changes which take place in sugar beets during storage, G. FRIEDL (*Kisérlet. Közlem.*, 14 (1911), No. 6, pp. 793-819).—The losses of sugar in beets during storage are due in part to the absorption of large amounts of water, which dilute the juice, but mainly to the consumption of saccharose by the respiratory process of the beet. This latter loss, however, can not be prevented unless the vital processes of the beet are checked or destroyed, and this can only be accomplished by impracticable methods as freezing or drying the beet. Invert sugar was found to be the intermediary product of saccharose destruction. The energy of respiration is dependent upon various factors. The nitrogen content of the beet was found to be more stable than the saccharose, and only at the end of the storage period was there a perceptible cleavage of protein. Of the cleavage products glutamin was formed to the greatest extent. No transformation of glutamin to glutaminic acid was noted.

The comparative influence of water and vinasse upon the pulp residues obtained from the manufacture of beet sugar and from the distillery, L. AMMANN (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 6, pp. 366-369).—The pulp obtained from the sugar-beet distillery is considered superior as a feed to that obtained from the beet-sugar refinery. This, however, is not regarded as due to the apparatus employed for the extraction of the sugar, but rather to the liquid which is utilized for extracting the sugar.

The desiccation of potatoes and the uses of the product, C. C. MOORE (*Abstr. in Science*, n. ser., 35 (1912), No. 897, p. 389).—"The desiccation of potatoes has been commercially developed in Germany, but the product has not been suitable for the manufacture of starch. Investigations have shown that a dried potato product can be prepared in a way suitable for starch manufacture. Owing to the greater degree of fineness to which the dried product can be reduced, over 90 per cent of the starch can be separated in the usual washing and decantation methods, as against a recovery of 65 to 75 per cent of starch when potatoes are ground in a fresh state."

Forest chemistry, 1909-10, P. SINOH (*Ann. Rpt. Bd. Sci. Adv. India*, 1909-10, pp. 26-30).—This is a report of the work done by the assistant chemist of the Imperial Forest Research Institute of India, including the manufacture of mangrove tannin extract from *Rhizophora mucronata*, distillation of *Blumea balsamifera* and *Rhusa* grass oil, manufacture of shellac, analysis of shellac, turpentine, colophony, *Canarium bengalense*, and campher from *Claniamomum glanduliferum*, and the refining of Koosam oil for soap making.

METEOROLOGY—WATER.

The climate of Ohio, J. W. SMITH (*Ohio Sta. Bul. 235, pp. 185-209, figs. 15*).—The available records on temperature, precipitation, humidity, sunshine, first and last frost, and wind movement are summarized in tables and charts.

It is shown that the average annual temperature for Ohio during the period from 1884 to 1910, inclusive, was 50.7° F. July is shown to be the warmest month, with an average temperature of 73.1°; January the coldest month, with a mean temperature of 27.7° F. At some time during this period the temperature went below zero in each month from November to March, inclusive, and below freezing in every month in the year except July. The average annual precipitation for the State as a whole during the period from 1854 to 1910, inclusive, was 33.80 in. June has shown the greatest average rainfall, with 4.13 in.; October the least, with an average of 2.52 in. "The snowfall averages less than 20 in. in the extreme southern portion of Ohio, and over 60 in. in northeastern counties. The prevailing winds are from the southwest over most of the State, and vary slightly with the season." The average number of rainy days is 122.

"Ohio is in the path of a large part of the general low pressure or storm areas which move across the United States from west to east. These areas move at an average speed of 600 miles in 24 hours and are preceded by southerly winds and higher temperature and followed by northerly winds and lower temperature. They are usually accompanied by cloudy weather and precipitation and each storm causes an average of from one to two rainy days at each place as they pass. . . .

"As there is an average of two of these storm areas each week with fair weather periods between them, it follows that the change in weather conditions is rather rapid. One or two days of stormy weather preceded by higher and followed by lower temperatures, succeeded by one or two days of fair weather preceded by lower and followed by higher temperatures, to be repeated in turn, makes up the usual routine for the week.

"Yet Ohio is far enough from the coast so that the damaging Gulf and Atlantic storms lose very much of their severity before reaching [the State]. The northwestern cold waves pass across the State with sufficient intensity to ventilate and invigorate the towns and cities and send their health-giving winds into all parts of the State, and yet the cold waves are not so severe in Ohio as in corresponding latitudes in the Mississippi and Missouri valleys."

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and R. N. HALLOWELL (*Massachusetts Sta. Met. Buls. 273, 289, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during March and April, 1912. The data are briefly discussed in general notes on the weather of each month.

The weather of 1911 at the Midland Agricultural and Dairy College, Kingston-on-Soar, Notts, F. WAKELEY (*Midland Agr. and Dairy Col. Bul. 7, 1911-12, pp. 61-66, figs. 2*).—The record of air and soil temperature, rainfall, frosts, and other weather conditions for 1911 is compared with those of the previous 6 years.

This shows that at this institution, which is situated at Kingston-on-Soar, Nottinghamshire, the mean temperature was 49.6° F., a little above the average; the maximum, 86.3° (on August 8), the highest on record; and the minimum, 14.2°, on February 1. The annual rainfall, 18.01 in., was much below the average of 25 in. The number of rainy days was 156 as against 204 the previous year.

Report of the work of the station of agricultural climatology of Juvisy during 1910, C. FLAMMARION (*Bul. Mens. Off. Renseign. Agr. [Paris], 11 (1912)*).

No. 4, pp. 460-477, figs. 7).—This includes the usual summaries of observations on temperature of the air, soil, and underground water, atmospheric pressure, humidity, rainfall, sunshine and cloudiness, and wind. There is also a brief discussion of the late summer and warm autumn characteristics of the climate of the region, as illustrated by conditions during the summer and fall from 1906 to 1910. The season of 1910 was wet, cold, and very unfavorable to crops.

Weather forecasts for 1912 in Russia, I. SAVIZKII (*Selsk. Khoz.*, 1912, No. 10, pp. 462-464; abs. in *Internat. Inst. Agr. [Rome], Bul. Eur. Agr. Inst. and Plant Diseases*, 3 (1912), No. 5, pp. 1097, 1098).—The success of long-time weather predictions in Russia is discussed. It is stated that the propitious weather of the season of 1909 was predicted 3 months before harvest, the drought of 1911 in September, 1910. The predictions for 1912 are given in some detail.

Our weather, J. S. FOWLER and W. MARRIOTT (*London*, 1912, pp. XI+131; rev. in *Nature [London]*, 89 (1912), No. 2220, p. 267).—This is one of a series of elementary books. After a brief introductory chapter explaining the practical need of a popular book on the weather, there follow chapters on pressure, temperature, humidity, wind, and allied phenomena, as well as on weather forecasting, the upper air, phenological observations, and weather proverbs and rhymes.

Smoke.—A study of town air, J. B. COHEN and A. G. RUSTON (*London*, 1912, pp. 86, figs. 35).—This book, the more important agricultural features of which have already been noted from another source (*E. S. R.*, 26, p. 727), deals with (1) solid products of combustion, (2) gaseous impurities, (3) town fog, (4) dispersal of soot, (5) influence of coal smoke upon health, (6) analysis and manuring value of soot, (7) analyses of Leeds rain water, and (8) sootfall of London.

Combined nitrogen in rain, C. T. GIMINGHAM (*Chem. World*, 1 (1912), No. 5, pp. 155, 156).—The various observations on this subject are summarized, the general conclusion being "that in rural districts the soil receives annually something between 5 and 6 lbs. of nitrogen per acre in the rain; and this, though a small amount, is by no means negligible in experimental work."

Ponds in agricultural districts, E. A. MARTIN (*Jour. Bd. Agr. [London]*, 19 (1912), No. 1, pp. 17-20).—The making and care of ponds for storage of water in time of drought are briefly discussed. It is shown that under the conditions prevailing in parts of England upland ponds dry up less rapidly than lowland ponds.

Sewage disposal, G. W. FULLER (*New York and London*, 1912, pp. XV+767, figs. 80).—This book records recent advances and gives the present status of both theory and practice in the field of sewage disposal. It deals essentially with American practice, particularly as observed in the author's experience, although European practice is not entirely ignored. The subject is treated from the viewpoint mainly of the operator of disposal works.

"The book is divided into 4 parts of approximately equal size. The first part is devoted to a somewhat lengthy description of the composition of sewage and the behavior of bacterial and biochemical processes in the decomposition of sewage. The importance of oxygen and deoxygenation, not only as a means of measuring the strength of sewage but in relation to proper conditions of the flow of sewage through collecting systems and various disposal devices, is discussed rather fully. The practical purpose of this is to show how to prevent or lessen 'putrefaction' with its objectionable odors. The significance of sewage disposal problems from various angles is explained in detail. In particular the relation of sewage bacteria to shellfish pollution is discussed with thoroughness at a time when this problem is being actively considered by Federal

and state authorities, who differ from the oyster growers in their views on general policy.

The second part of the book is devoted to a recital of American experience in the disposal of sewage by dilution in inland streams, lakes, tidal estuaries, and bays. Although several early American reports upon this subject were prepared with much thoroughness, they have not received the attention in recent years that they are entitled to. The prevailing method in America of disposing of sewage by dilution has been applied in a faulty way in many instances, and corrective measures are needed. It is not necessary, however, in a majority of cases, to abandon this method in favor of complete purification. The limiting factors and conditions in present practice are described at length, with suitable summaries.

The third part of this book deals with what have been generally called preliminary arrangements for the treatment of sewage. Screening, settling tanks, septic tanks, chemical precipitation tanks, electrolytic treatment, and strainers are discussed in much detail, particularly septicization in two-story tanks. Résumés as to their present standing are given for each device.

The fourth part deals with filtration matters with a view to recording present practice. The closing pages of the book are devoted to aeration, sterilization, and ozonation processes as they are now understood, with a few explanations as to institutional and residential plants, and a final comparative summary of general costs and efficiencies."

The chapter on broad irrigation is of special interest from an agricultural standpoint. In a résumé of this chapter it is stated that "in America broad irrigation or sewage farming is not practiced to-day even in the arid regions so as to give satisfactory results for the sanitary disposal of sewage. There may be scattering exceptions to this statement, but an examination of the present facts does not bear out earlier reports that broad irrigation is really used regularly and carefully in numerous places.

Objections to the method have increased rather than decreased in recent years. These relate to objectionable odors, prejudices against the use of sewage in growing vegetables, and to the transmission of disease germs by flies and other insects.

Experience shows that only nominal aid financially has been received from the use of sewage in broad irrigation.

"The present outlook is that broad irrigation or sewage farming is decidedly on the wane with little prospects of adoption even in the arid districts except perhaps for an occasional project where local conditions are unusually favorable."

Practical methods of sewage disposal, H. N. OGDEN and H. B. CLEVELAND (*New York and London, 1912, pp. VI+132, pl. 1, figs. 51; rev. in Engin. News, 67 (1912), No. 24, p. 1157*).—This book explains the increasing need for more efficient means of sewage disposal in country homes and rural communities. It deals with the individual system as distinguished from the community or municipal plan of disposal. "The higher standards of living which have made themselves felt throughout the rural community have demanded in farm-houses and country homes sanitary conveniences which have hitherto been wanting.

"Gradually every house is using more and more water for various purposes, and living conditions, which in the past tolerated a scanty supply drawn from a pump, are no longer endured. The increased water supply and the demands of extended plumbing mean a greater amount of sewage—so great an amount that in many cases, soils which could receive and digest the waste waters

from houses supplied by wells are clogged and made impervious for the greater amount.

"Further, the danger to wells from the infiltration of cesspools is now feared, and it is understood as never before that in order to maintain the highest degree of health in a family the drinking water used must be above suspicion and not subject to contaminating influences in the vicinity.

"Again, communities are being aroused to the intrinsic value of maintaining streams in a pure condition—partly because of the value of fish and ice coming from the streams themselves, and partly on the broad ground that water courses belong to the country as a whole, and must be kept pure for the sake of succeeding generations, not spoiled for them on account of the selfishness of a few at the present time.

"Thus it is that to-day the problem of sewage disposal, while arousing general interest, is recognized as one which requires more than the common sense of an average person, that the force and principles involved are understood to be not those in common use, and that, for successful disposal of sewage, special knowledge and judgment are required."

The book divides sewage purification into two processes, (1) preliminary sedimentation, as for example, by means of the Imhoff or Imhoff tank, and (2) final disposal by subirrigation, sand filter, contact bed, or sprinkling filter. The sprinkling filter system is considered more complicated, and less suitable for this reason, than the others.

The merits and faults of broad irrigation as a method of disposing of sewage are quite fully set forth. With suitable soil and slope, and proper care, this method is deemed efficient and productive of increased crops, but it requires watchful care and much labor to prevent offense and danger to health.

The design, construction, and cost of the sewage systems are presented in text, tables, and sketches.

SOILS—FERTILIZERS.

Present problems in soil physics as related to plant activities, B. E. Lavinson (*Amer. Nat.*, 46 (1912), No. 545, pp. 294-301).—In this paper, which was presented in the symposium on problems of the soil at the Washington meeting of the American Association for the Advancement of Science, the author considers the soil moisture relations of the underground parts of the plant to plant activities. The following summary is given:

"The soil water relation is of fundamental importance if we are some time to know about and be able to predict and control plant processes. The moisture of the soil, as well as its other features, is most profitably to be studied as plant environment, the relations which obtain between plant activity and soil phenomena comprising a fundamental and primary requirement for the scientific advance of our knowledge. The physical nature of the subterranean environment of terrestrial plants is effective in controlling plant activities, mainly with regard to the possible rate of delivery of water by the soil to unit area of absorbing roots. It is highly desirable to study this power of water delivery with reference not only to the growth of plants, but also to other soil characteristics, some of which are already commonly measured. The whole problem of the physics of the subterranean surroundings of rooted plants awaits the development of an instrumentation which will not necessitate the preliminary destruction of some of the most important soil properties before the soil can really be studied."

The temperature of the soil under different conditions, W. R. Dunbar (*Agr. News [Barbados]*, 11 (1912), No. 261, p. 155).—Observations on temperature of

different soils in dry and in wet localities, and as influenced by depth, color and texture, fertilizers, and cultivation, are reported.

Soils in a wet locality maintained a lower temperature than those in a dry locality. This is attributed to the cooling effect of the rainfall with its subsequent evaporation, to direct sea breezes, and to the absorption of radiant heat by clouds.

The temperature of the soil at 3 in., at 6 a. m., was 72° F. and increased to a maximum of 91° at 4 p. m. There was a quick drop after sunset. The temperature at 3 in. remained more constant, and was lower during the day than at 3 in. but higher at night. "At a depth of 1 ft., the temperature remained nearly constant during the day, but it was 2° lower at night than during the day. The maximum temperature was 85°. At a depth of 2 ft., the temperature was 83° and remained constant day and night. A heavy shower of rain lowered the temperature by 1° on another occasion. . . .

"The sand plat was warmer at 1 p. m. than the soils of the other plats, and was cooler at 7 a. m. The temperature of the untouched sand at 1 p. m. was 99°; that of the cultivated sand 90°. The temperature of the dry sand had a diurnal range of 20°; this was considerably greater than that of the air. In the case of all the plats, the effect of water in leveling up the specific heats was clearly indicated. At 1 p. m. the clay was warmer than the humus plat, but cooler at 7 a. m. The lime plat (untouched) was 13° cooler at 1 p. m. than the sand plat (untouched), and the lime plat also possessed the lowest diurnal range, which amounted to 6 to 8°."

Cultivating, particularly forking and plowing, had a cooling effect. "Rolling warmed the soil in dry weather, but had the opposite effect when the land was wet. As regards ridging or banking up, the important fact was brought out that land cultivated in this manner from east to west is at least 3° warmer during the day than when the soil is ridged north and south. At a depth of 3 in. the difference would be at least 6°. The well-known fact that wind cools the soil was also supported by observations made in sheltered and unsheltered places. The soil under pasture was rather cooler than arable soil, and covering arable soil with light-trash lowered the temperature during the day by 4°." Soil shaded with cacao plants was 11° cooler at 1 p. m. than soil exposed to the sun, and at 7 a. m. it was cooler by 3°.

Studies of the heat conductivity of some soil types, H. KARSTEN (*Internat. Mitt. Bodenk.*, 1 (1912), No. 6, pp. 524-543, figs. 4).—Studies of the theory of heat transference in masses of spherical bodies, and determinations of the same in soils of different structure and moisture content, are reported, using a modification of the Christiansen apparatus. The theory that the heat conductivity of spherical, homogeneous bodies of the same size is independent of the length of their radii was substantiated. The heat transference was influenced by the structure and particularly by the moisture content of the soil.

Suspensions and the phenomena of absorption, S. ARRHENIUS (*Rev. Sci. [Paris]*, 49 (1911), I, No. 15, pp. 449-456).—This is a mathematical discussion of the laws and phenomena of absorption in solutions, based on investigations by different authors.

The plant and the salts of the soil, N. M. TULAIKOV (*Zhur. Opytn. Agron. [Russ. Jour. Expt. Landw.]*, 13 (1912), No. 1, pp. 27-53, figs. 4; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 6, p. 1297).—It is stated as a result of studies that the water-soluble nonnutritive salts of the soil had a decided influence on the growth of vegetation, both in its earliest and in its last stages of development.

In the earliest stages of growth the action of the salts was physical, in that it brought about a certain degree of osmotic pressure and thereby regulated

the absorption of water by the germinating seeds. Equimolar solutions of the salts were only slightly discernible, and isotonic solutions of different salts produced very similar effects. The toxicity of the different salts to plants as a rule manifested itself in plasmolysis of the contents of the root cells. In some cases the salts seemed to have a chemical action, destroying the structure or coagulating the contents of the surface cells of the roots.

Variations in the content of nonnutrient salts in the soil solutions were clearly reflected in the character of the growth of the plants and in the yield, there being in solutions of high concentration and osmotic pressure quicker changes in phases of growth, a reduction in total yield and yield of grain, and, on the other hand, a marked increase in the amount of nitrogenous substances in the plant and particularly in the amount of albumin in the grain (of wheat). The effect of the osmotic pressure of the soil solution on the production of nitrogen in the wheat grain was especially marked during the period of filling and ripening of the kernels.

The biological absorption of phosphoric acid in the soil, A. I. DUBCHENKO (Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 5, pp. 658-668; abs. in Zentbl. Agr. Chem., 41 (1912), No. 5, pp. 303, 306; Jour. Chem. Soc. [London], 102 (1912), No. 597, II, p. 677).—Studies of the biological absorption of phosphoric acid from solutions in soils receiving starch and treated with thymol and with chloroform are reported. Tests of the influence of sodium nitrate on the biological absorption were also made.

From the results of these studies it is concluded that in addition to the physico-chemical absorption of phosphoric acid there was a biological absorption. The latter increased with the starch content of the soil and also with the length of time. It was more pronounced with the larger applications of phosphoric acid. The fixation of phosphoric acid by the micro-organisms took place not only from the readily soluble forms but from the difficultly soluble phosphoric acid of the soil as well, and was stimulated by additions of sodium nitrate. Bacterial fixation of phosphoric acid was accompanied by a dissolving process.

The origin of loess, C. L. HENNING (Internat. Mitt. Bodenk., 1 (1912), No. 6, pp. 518-523).—Different theories regarding the origin of loess deposits are stated, and the American literature is briefly reviewed with particular reference to the work of E. E. Free of the Bureau of Soils (E. S. R., 25, p. 424).

Soil fertility, C. G. HOPKINS (Illinois Sta. Circ. 157, pp. 16).—This is an address delivered before the Illinois State Farmers' Institute in which the author discussed the more important methods and results of Illinois soil investigations which support the conclusion "that for the most economic and profitable systems of permanent agriculture in general farming, we should make large use of natural materials including for normal soils ground limestone, raw rock phosphate, and organic matter to be supplied by plowing under legume crops and other crop residues, either directly or in farm manure."

Cooperative study of Rhode Island soil deficiencies, H. J. WHEELER ET AL. (Rhode Island Sta. Bul. 149, pp. 47-79, pls. 2).—Accounts are given of experiments begun in 1890 on a number of farms in different parts of the State with a view of determining their lime and fertilizer requirements. The results have previously been reported in large part in bulletins and reports of the station (E. S. R., 15, p. 665; 19, p. 317; 23, p. 21).

Soil mapping and soil analyses, D. J. HISSINK (Cultura, 24 (1912), Nos. 283, pp. 128-132; 284, pp. 158-163).—This is a summary of the work of Hall and Russell with reference to the soils of southeast England (E. S. R., 26, pp. 118, 119), and is offered as a criterion by which to determine the expediency of conducting agricultural soil surveys in the Netherlands.

Investigation on pine-covered sand dune soils, K. VOCKE (*Internat. Mitt. Bodenk.*, 1 (1912), No. 6, pp. 495-517, pls. 3).—The pine forests of Melchow near Danneberg having shown a marked difference in productivity, the author made a series of mechanical and chemical analyses of samples of soil from areas supporting a vigorous forest growth and from devastated areas, parts of which had been reforested, with a view of determining the limiting element of plant food. A comparison was made of the results of these analyses with those of forest soils by other investigators.

The results showed that these sand dune soils were low in mineral constituents but that, notwithstanding this fact, they produced heavy crops of pine trees where sufficient amounts of nitrogen and humus were present in the soil. The yield of pine trees was in direct proportion to the nitrogen and humus content of the soil, and it is believed, therefore, that for the improvement of these dunes, and probably also of most of the forest soils of northern Germany, which have been shown to contain at least an equally high mineral content, the application of mineral fertilizers is not necessary but that consideration should be given to the matter of increasing and conserving the nitrogen and humus content of the soil.

Studies of the tillable soils of Roumania, G. MURDOCH (*Internat. Mitt. Bodenk.*, 1 (1912), No. 6, pp. 544-562).—References to the more important literature on the subject are given, with a brief discussion as to the scope of the different works.

The composition of sandy soils of Tripoli, A. MENOZZI (*Agr. Mod.*, 13 (1912), No. 6, pp. 81-83).—The results of mechanical and chemical analyses of soil samples from different parts of Tripoli and from Sfax in Tunis, including tests of the absorption of ammonia and phosphoric acid from solutions, are reported and briefly discussed.

Some cotton soils of the Nyasaland and Uganda protectorates (*Bul. Imp. Inst.* [86. Kensington], 10 (1912), No. 1, pp. 55-74).—The results of mechanical and chemical analyses of a number of samples of typical soils from different parts of the regions to determine their suitability for cotton growing are reported and briefly discussed. The soils, in general, contained sufficient amounts of plant-food constituents. In some cases, however, the percentage of nitrogen and of phosphoric acid was slightly below the average for good cotton soils. The mechanical condition of the soils was satisfactory.

The pinery and orchard soils of the Bathurst Division, Cape Province, J. LAWIS (*Agr. Jour. Union So. Africa*, 3 (1912), No. 3, pp. 357-371).—The pineapple crops of the region having shown a steady deterioration, the author made a series of analyses of typical soils and of average fruit and plants with a view of determining their plant-food requirements. Analyses of apple and orange soils were also made.

The results, in general, showed that, although the soils may be considered of medium quality, the pineries were in every case deficient in one or more of the necessary soil constituents. The use of ordinary mineral fertilizers is recommended to supply the deficiency. The apple and orange soils were generally poor in lime, potash, and phosphoric acid, and a few were also poor in nitrogen.

[Analyses and determinations of moisture of Queensland soils], J. C. BAUMANN* (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1909-10, pp. 44, 50-56).—Analyses of soils of newly opened banana and pineapple districts calculated to pounds of plant food per acre for a depth of 1 ft., and determinations of soil moisture at various depths and in relation to cultivation are reported.

The soils, in general, were well supplied with the mineral constituents of plant food. It is stated that the value of the soil analyses would be very much

increased by more complete data as to the origin of the salts, and the starting of detailed soil surveys by districts has therefore been recommended.

The results of the moisture determinations show that in the uncultivated block very little of the water which fell during December and January was absorbed by the soil, and that in spite of the good rain the amount of moisture remained practically the same at the various depths of 6 in., 1 ft. 6 in., 2 ft. 6 in., and 3 ft. 6 in. during the months of December, January, and February. Very heavy rain fell before the March sample was taken, and the soil from the top layer right down to 3 ft. 6 in. benefited by this rain, but the moisture again was very rapidly lost after a few weeks without rain. In the cultivated land the conditions of absorbing moisture were more favorable, and again the loss of moisture by evaporation was considerably diminished. Very striking, however, is the difference caused by the Campbell system of cultivation and also in the land worked bare fallow, which cause the moisture to be completely conserved in the top layers, and almost completely prevented the loss by evaporation during months of dry weather."

Fertilizers and crops, L. L. VAN SLYKE (*New York and London, 1912, pp. XIV+734, pl. 1, figs. 132*).—This book, by the chemist of the New York State Station, attempts to make "practical application of the results of investigation to the use of plant food in the growing of crops." It embodies the main results of investigation in this country and abroad, including the author's studies, observations, and experience in this field during the past 25 years.

"The purpose has been not merely to give information but to present it in such a systematic way as to show certain fundamental relations and make clear, as far as possible, the reasons underlying every practice suggested."

"In the selection and arrangement of the materials, the writer has kept in mind the needs of practical farmers as well as those of classes in agricultural colleges and high schools."

The book is divided into 4 parts, part 1 (pp. 1-233) dealing with factors of soil fertility, part 2 (pp. 235-393) with sources and composition of materials used as fertilizers, part 3 (pp. 395-507) with factors in the selection of fertilizing materials, and part 4 (pp. 509-710) with the practical use of fertilizers in the growing of individual crops.

Commercial fertilizers and agriculture of the Alps, O. KESTER (*Dent. Landw. Presse, 39 (1912), Nos. 33, pp. 391, 392, figs. 4; 34, pp. 402, 403, figs. 7*).—This is an account of the agricultural practices of the Alps and of experiments with barnyard manure and commercial fertilizers, showing that the practice of supplementing barnyard manure with a phosphatic fertilizer greatly increased the yield of crops, and in turn enabled the farmer to keep more stock and thus produce larger amounts of manure. Complete mineral fertilizers are recommended only where sufficient manure to fertilize the entire farm is not produced.

Calcium cyanamid as compared with nitrogenous fertilizers, L. R. DA SILVA (*Rev. Agron. [Portugal], 9 (1911), No. 1-6, pp. 94-107*).—Comparative tests of calcium cyanamid, sodium nitrate, and ammonium sulphate with various crops are reported.

The constitution of basic slag, HARTLEY (*Zentr. Offent. Chem., 17 (1911), No. 20, pp. 381-384; abstr. in Chem. Abs., 6 (1912), No. 5, p. 663*).—The author maintains substantially that Blome's experiments with fusions of tricalcium phosphate, lime, and silica (*El. S. R., 25, p. 121*) throw no light on the constitution of Thomas slag or on the cause of the increase in citrate solubility of the phosphoric acid of the slag when it is fused with sand.

The influence of lime on cultivated soil (*Arch. Suiderindia, Nederland. Indië, 20 (1912), No. 13, pp. 379-383*).—This is a brief review of the investigations on this subject by Thaer (*El. S. R., 25, p. 823*).

The trade in cotton-seed meal, E. H. JENKINS (*Connecticut State Sta. Bul.* 176, pp. 4).—The plan worked out by the station, by which the dealer and consumer of cotton-seed meal may be assured of its quality, is described.

Experiments with gas purification residue as a weed killer, insecticide, and nitrocellulose fertilizer, H. VON FEILITZEN (*Fühling's Landw. Ztg.*, 61 (1912), No. 4, pp. 235-234).—The results were not very favorable to the use of the material for the purposes named.

Tannery refuse as a fertilizer, H. W. HEALY (*Rural New Yorker*, 71 (1912), Nos. 4151, p. 622; 4152, p. 643).—The method of preparation, nature, and fertilizing value of tannery-refuse, ashes, and liquid are discussed. The first two are rich in lime, the latter is acid. The refuse contains from 0.75 to 2 per cent of nitrogen. The ashes contain in addition to from 30 to 50 per cent lime, from 0.75 to 1.5 per cent potash and 0.5 per cent phosphoric acid. Tannery liquids are of no fertilizing value until neutralized with lime and in some cases allowed to putrefy. Successful practical experiments in the use of refuse and ashes are referred to.

Refuse disposal, Toronto, Ont. (*Engin. News*, 67 (1912), No. 8, pp. 325-328; *Engin. and Contract.*, 37 (1912), Nos. 11, pp. 293-296; 13, pp. 351, 352; 15, pp. 47-49).—This is a condensation of an extended report by R. Hering and H. Gregory, and deals with 2 methods of disposal, "(1) the incineration of garbage mixed with other and more combustible refuse, with no utilization of the heat of combustion, and (2) the treatment of garbages alone by the reduction process for the recovery of grease and of tankage for fertilizer base, and with the separate incineration of combustible refuse. The low price at which hydro-electric power is available in Toronto turned the scale in favor of the second alternative. If the salable portions of the combustible refuse were sorted out and sold and only the remainder burned, the estimates indicate a small profit from the combined operations of the reduction works and incinerating plants; otherwise there would be a slight yearly expense."

Analyses of fertilizers, fall season, 1911, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr.*, 33 (1912), No. 3, pp. 96).—This bulletin contains analyses of fertilizers collected by the fertilizer inspectors of the North Carolina state department of agriculture during the fall of 1911, as well as a list of brands of fertilizers registered for sale during the season 1911-12.

Tabulated analyses of commercial fertilizers, J. TOMLINSON (*Tenn. Dept. Agr. Fert. Bul.* 1911, pp. 50).—Analyses and valuations of fertilizers offered for sale in Tennessee during 1911 are reported. The text of the state fertilizer law and a schedule of current prices of fertilizing materials are also given. It is stated that 68,971 tons of fertilizers were sold in Tennessee during 1911 as compared with 58,612 tons in 1910.

Analyses of licensed commercial fertilizers, 1912, F. W. WOLL (*Wisconsin Sta. Circ. Inform.*, 33, pp. 12).—This circular gives a list and guaranties of fertilizers licensed for sale in Wisconsin during the year, analyses of samples submitted by the manufacturers and collected by the station inspectors, and explanations of terms used in statements of analyses of fertilizers and in discussion of the subject of soil fertility.

AGRICULTURAL BOTANY.

Plant physiology, W. PALLADIN (*Pflanzenphysiologie*. Berlin, 1911, pp. 71-310, figs. 180).—This is a German edition, revised and brought up to date, from the sixth Russian edition of the author's work on plant physiology. It treats extensively of the chemistry of physiological processes.

Preliminary announcements of new findings in germination studies with *Aloris ciliata*, G. GÖTTSCHE (*Ber. Deut. Bot. Gesell.*, 29 (1911), No. 10, pp.

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769-772).—This is a preliminary account of studies of the influence of resting germination, particularly those of light, and temperature changes on the seed bed. The author states that associated as modifying influences with the light factor are the 3 subfactors of oxygen access (affected by presence or absence of chaff), germinating temperature, and resting period (after maturity).

Seeds were subjected to maximum and minimum constant temperatures and comparisons made with lots in which high and low temperatures were employed for various definite periods. It was found that, while the absence of chaff raised the rate of germination in all cases, a constant high temperature (33 to 34° C.) gave almost a maximum rate of germination and in general the higher rates (94 to 95 per cent) were obtained by the longer periods of exposure (over half the day) to the high temperature. The lowest rate (29 per cent) resulted from exposure of the chaff-covered seeds to the minimum constant temperature (19 to 20°).

Temperature and seed germination, E. LERMAN (Ber. Deutsch. Bot. Gesell., 29 (1911), No. 8, pp. 577-589).—The author gives a preliminary report of a series of investigations not yet complete on the effects of temperatures and temperature changes on the germination of seeds sensitive to light. The work stands in close relation to that of W. Klnzel (E. S. R., 22, p. 720; Z. N. D. 821). In part the same material was chosen and studied, with the results which were partly different or opposite given in considerable detail.

The effect of heat on seeds in a state of anasthesis, J. APOST and E. GAY (Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 24, pp. 55-58).—In previous publications (E. S. R., 22, pp. 27, 436) the authors showed the action of anesthetics and heat on the diastases of seed. In the present paper a brief account is given of experiments showing the effect of heat and anesthetics on germination.

Different lots of wheat were subjected to ether and ether vapors and then placed in water heated to 53° C. for 5 minutes, and the effect on germination determined. All lots of seed had been previously placed in cold water to bring their moisture content to about 21 per cent. The results show that, other conditions being equal, wheat subjected to anesthetics is much more affected by high temperature than seed not treated with ether. A few minutes' exposure to ether followed by the application of heat was sufficient to destroy the vitality of all the seed. Similar results were obtained with other anesthetics, as chloroform and a solution of cocaine.

If the interval between exposure to ether and placing the seed in hot water was progressively increased, the effect of the anesthetic appeared gradually to diminish and the percentage of germination to increase correspondingly.

The so-called respiration of powdered seeds, L. IWANOFF (Ber. Deutsch. Bot. Gesell., 29 (1911), No. 8, pp. 563-570).—The author reports a continuation of his investigations on carbon dioxide evolution and alcoholic fermentation in seeds (E. S. R., 20, pp. 731, 822), claiming that these support his former conclusions, namely, that the carbon dioxide evolved is largely, if not entirely, of anaerobic origin.

Effect of warm baths on respiration and germination of resting plants, P. P. ISAKLIONOV (Trudy Imp. S. Peterb. Obshch. Estestvo, (Trac. Soc. Imp. Nat. St. Petersburg), 42 (1911), III, No. 2-3, pp. 259-270, figs. 4).—The author sums up the conclusions reached in his investigations substantially as follows:

Warm baths heighten the energy of respiration only during the first few days, after which the respiration curve remains at its normal resting level until it rises on germination. The effects of the warm bath are to be attributed not only to the influence of temperature but also to that of the water. This effect is not a simple and transient stimulation but a complex, deep-lying

shows the end result of which is the awakening of the plant. The experiments seem to indicate the activity of enzymes in this connection. It appears that along with oxidation (as evidenced by the carbon dioxide product) several other processes occur, some of them accompanied by evolution of heat.

Shortening the resting period of shoots by wounding and injection of water, F. WIESNER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl.*, 120 [1911], I, No. 3, pp. 179-194, pl. 1).—A report is made in regard to experiments conducted with buds on twigs of several sorts in hothouses, either by merely wounding, or in addition thereto, injecting water at the base of the bud.

It was found that in almost every case injured buds preceded in opening and rapidly outgrew the buds on the same sprouts not so treated. It appeared that the wounding was the most significant factor, but that the injection of water also played a certain rôle in the abnormally early and rapid development.

The influence of enzymes on the respiration of plants, S. D. L'VOV (*Izv. Imp. Akad. Nauk. (Rus. Acad. Imp. Sci. St. Pétersb.)*, 6. ser., 1911, No. 9, pp. 655-678; *abs. in Jour. Chem. Soc. [London]*, 100 (1911), No. 585, II, p. 641).—The author reports that taka-diastase exerts a stimulating action on the respiration of living or dead plants of *Vicia faba* and wheat. This action is especially marked with living plants where anaerobiosis initially takes the form of alcoholic fermentation. Merck's diastase produced effects opposite to, and of less magnitude than, those of taka-diastase.

Emulsion was found to produce the same effects in the boiled and the unboiled condition and to exert a marked retarding action on alcoholic fermentation brought about by hefanol. It exhibited a stimulating influence on the respiration in dead seeds, hence under abnormal conditions, but on the normal respiration of living higher plants it had no effect.

Further studies on the light requirement of plants in relation to leaf form and position, J. WIESNER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl.*, 120 [1911], I, No. 3, pp. 119-178).—This is a report on a continuation of the author's former studies on light relations of leaves (*E. S. R.*, 23, p. 724), and is a somewhat extended discussion of leaf position as related to light requirement.

Plants with leaves which show no relation of their position to the incidence of light are here called aphotometric. Other plants assume positions which are favorable to light incidence or to protection for oversupply. These positions may become fixed, as in the case of the compass plants, etc.

The results of studies made on several plants are given in some detail.

The relation of light and temperature to leaf fall, O. VARGA (*Österr. Bot. Ztschr.*, 61 [1911], No. 2-3, pp. 74-88; *abs. in Magyar Bot. Lapok [Budapest]*, 19 [1911], No. 11-12, pp. 448, 449).—The author reports a direct relation between a lack of light and a low temperature and leaf fall of plants through the influence which these factors have in diminishing transpiration and assimilation. A reduction of light or temperature appears to act through the assimilation and transpiration of the plant, stimulating the formation of the abscission layer at the bases of the petioles and resulting in the fall of the leaves.

Studies on cessation of flowering, H. WACKER (*Jahrb. Wiss. Bot. [Pringsheim]*, 49 [1911], No. 4, pp. 522-578, pls. 3, figs. 5; *abs. in Ztschr. Bot.*, 4 [1912], No. 2, pp. 183, 184).—This is a comparative study of the various phenomena accompanying this change in case of many flowers.

Opening and closure of stomata as shown by the method of infiltration, H. MORGAN (*Ztschr. Bot.*, 4 [1912], No. 2, pp. 106-122, figs. 2).—A new method of demonstrating the closure or degree of opening of stomata is described, which

consists essentially in placing upon the under surface of the leaf a small portion of a certain liquid and observing the rate of its imbibition as evidenced by its forming in that part of the leaf a spot which, by transmitted light is translucent.

For this purpose it is stated that water will not answer, but alcohol is found suitable, while benzol, xylol, and oil of turpentine are very much more sensitive indicators in most cases. With a decrease of the openings, imbibition diminishes. At a certain point alcohol, it is claimed, ceases to pass, while the other liquids continue to enter, thus distinguishing between very small degrees of opening and absolute closure. Detailed and tabulated findings are given of a great number of studies carried on with many different plants. Stomata in fresh leaves were nearly always found to be open on sunny days, but nearly or entirely closed at night. In case of wilted and dried leaves the stomata were usually almost or quite closed, in many cases even to benzol.

Several advantages are claimed for this method over others now in use, some of which are here discussed, as are also the results obtained by their employment.

A new method of estimating the aperture of stomata, F. DARWIN and D. F. M. PERIZ (Proc. Roy. Soc. [London], Ser. B, 84 (1911), No. B 368, pp. 136-154, figs. 10; abs. in *Ztschr. Bot.*, 4 (1912), No. 2, pp. 142, 148).—The estimate of stomatal aperture obtained by this method (called the porometer method) is based upon the amount of air drawn through a funnel tube, glued to the stomatal surface of the leaf, as shown by a column of water in the stem of an attached and partly exhausted T-tube. The air is drawn through the stomata outside the glass funnel, through the leaf tissue, and again through the stomata inside, its amount and variations being measured by means of the fall of the water column in the stem of the T-tube. The merits claimed for the method are that (1) the results obtained are independent of transpiration and (2) the living, uninjured stomata can be studied continuously for hours or days together.

Among the results given of studies already made by this method, it is claimed to have been shown that in case of leaves severed from the plant the first effect of withering is the opening of the stomata, followed, however, by their closure. Publication of other results is also promised.

Transpiration in wet leaves, V. S. ILIN (*Trudy Imp. S. Peterb. Obshch. Estestvo. (Trav. Soc. Imp. Nat. St. Petersb.)*, 42 (1911), III, No. 2-8, pp. 353-414, figs. 23).—This is an account of a series of experiments on the transpiration and related phenomena in leaves soaked in water or in solutions of salts.

It was found that when the stomata are open naturally transpiration in wet plants is always heightened and that such plants desiccate rapidly, the curve of transpiration approximating that shown by plants in the damp atmosphere of dewy mornings. If compelled to open their stomata, however, by immersion in potassium nitrate solution, the plants show no increase in transpiration or in rapidity of desiccation. No such increase of transpiration follows the wetting of plants the stomata of which are closed, except a slight increase observable after long-immersion in case of plants having thin cuticle. Immersion tends to cause closure of the stomata, but this tendency is opposed by light. Some leaves lost up to 43 per cent of their weight before their stomata were found to be closed. Transpiration curves showed interrupted variations which bear a certain relation to the curves of water-absorption by the leaves.

Transpiration and the ascent of sap, H. H. DIXON (*Ann. Rpt. Smithsonian Inst.*, 1910, pp. 407-425, figs. 4).—A summary is given of evidence that is held to support the author's cohesion theory of the ascent of sap in plants (*H. S. R.*, 18, p. 825; 21, p. 725).

Measuring the transpiration of emersed water plants, C. H. OTIS (*Rpt. Mich. Acad. Sci.*, 13 (1911), pp. 250-253, pls. 2).—A description is given of a form of tank devised by the author for measuring the evaporation of emersed water plants.

It was found that unsubmerged water plants transpire large quantities of water, and that this takes place principally during the day time. In the case of the one exception, the water lily, the presence of the plants in the tanks materially retarded evaporation from the free water surface.

The relative wilting coefficients for different plants, L. J. BRIGGS and H. L. SHANTZ (*Bot. Gaz.*, 53 (1912), No. 3, pp. 229-235).—Observations have been made of a considerable number of plants growing in different types of soil to determine their wilting coefficient (*E. S. R.*, 26, p. 822). These included cereals, grasses, and wild plants from semiarid and arid regions, and the results obtained led the authors to conclude that the variation exhibited in the wilting coefficient of different plants is much less than has hitherto been supposed, and that it is insignificant compared with the range in moisture retentiveness exhibited by different soils.

Only slight differences were found to exist among the various crops in their ability to reduce soil moisture content before wilting occurs. Sorghum, millet, wheat, oats, barley, and the grasses are practically the same. Rye and rice appear a little lower than the mean, and corn and the legumes slightly higher.

Conditions which affect the branching of roots, LULU M. NEWLON (*Rpt. Mich. Acad. Sci.*, 13 (1911), p. 200).—Observations were made on a number of species of plants to determine the factors which influence the branching of roots. It is a well-known fact that when roots are injured at their tips they produce lateral rootlets, but the experiments, in which about 1 dozen species of plants were used, indicate that contact does not act as a stimulus for the production of lateral roots. In most of the plants lateral roots were freely produced in the soil. In some aquatic and semiaquatic plants light inhibited the growth of the roots, while in the terrestrial plants, when the roots were under water, the lateral branching took place with equal freedom in light and in darkness.

Agricultural microbiology, E. KAYSER (*Microbiologie Agricole*. Paris, 1910, 2, ed., rev. and enl., pp. 481, figs. 95).—This is a revised and enlarged edition of a work previously noted (*E. S. R.*, 17, p. 849).

Soil fungi, H. N. GODDARD (*Rpt. Mich. Acad. Sci.*, 13 (1911), pp. 208-214).—A preliminary report is given of fungi found in soils, which indicates an abundant fungus flora which is conspicuous, rather uniformly distributed, and constant in different soils. Tillage and manuring, so far as observations have gone, seem to produce little change in the species and number of individuals present. Many of the fungi show variability in their structural characters when cultivated on media of constant composition. One form, which showed the structural characters of *Fusarium* and *Cephalosporium*, is thought to be the probable cause of a wilt disease which attacks several species of garden plants, including asters, sweet peas, zinnias, and *Salvia splendens*.

The occurrence of *Zygorhynchus moelleri* in Michigan, H. GROSSMAN (*Rpt. Mich. Acad. Sci.*, 13 (1911), pp. 204-207, figs. 2).—The author reports the discovery in soil samples of *Z. moelleri*, a rather common soil fungus of Europe.

Formation of volatile acids after fermentation, A. OSTERWALDER (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 20-25, pp. 481-498).—The author studied the after growth of several yeasts in fruit and grape juices with reference to the simultaneous production of volatile acids, with findings substantially as follows:

After the cessation of fermentation by pure yeast a new and often luxuriant growth appears, showing as flocculent or glistening layers of new yeast on or near the bottom. Under the same circumstances and at the same time at from 20 to 22° C. in 4 or 5 months a volatile acid, said to be acetic, forms to the amount of about 0.18 per cent. This apparently depends not upon the presence of unfermented sugar or upon the simple oxidation of alcohol but upon the presence of certain kinds of yeast. The author thinks it possible, however, that these yeasts are able by means of oxidases to oxidize alcohol to this acid.

A new fermenting fungus, A. OSTERWALDER (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 11-14, pp. 257-272, pl. 1, figs. 2).—Continuing the above studies, the author reports that he has discovered, isolated, and cultivated an actively fermenting fungus said to be new and by him named *Monilia vini*, in regard to which the following particulars may be noted:

M. vini, isolated from an acid apple wine, proves to be the most active in producing fermentation of all the *Monilia* forms, completely fermenting fruit and grape wine, this change occurring most rapidly with free access of air. The new species is able to develop rapidly in as strong a solution as 1.2 per cent of malic acid, also to ferment sugar in 0.4 per cent of alcohol, giving as a result of such fermentation both volatile and nonvolatile acids along with alcohol. It appears able to ferment any sugar remaining after the cessation of ordinary vinous fermentation, to the advantage of the wine, showing no injurious effects. It seems to ferment most rapidly dextrose and levulose; less rapidly saccharose, lactose, and galactose; and least rapidly maltose. In fermentation of the last of these and the first two the fungus develops much volatile acid.

Biological characteristics are described at some length.

The mycorrhiza of *Solanum*, N. BERNARD (*Ann. Sci. Nat. Bot.*, 9. ser., 14 (1911), No. 4-6, pp. 235-258, figs. 12; abs. in *Bot. Gaz.*, 53 (1912), No. 3, p. 271).—In continuation of investigations on the association of fungi with the formation of tubers in certain plants (*E. S. R.*, 14, p. 635), the author had begun a study of tuber formation in *Solanum*, but the work was stopped by his death. In the paper presented some account of his investigations is given. He had found that *S. dulcamara* and *S. maglia* when grown under normal conditions had their roots infested with fungi, but that when grown in gardens *S. maglia* did not show any mycorrhiza. The results obtained are believed to be suggestive of tuber formation in the potato in a wild state.

Gastrodia elata and its symbiotic association with *Armillaria mellea*, S. KUSANO (*Jour. Col. Agr. Imp. Univ. Tokyo*, 4 (1911), No. 1, pp. 1-66, pls. 5, fig. 1).—According to the author, *G. elata* is a nonchlorophyllous orchid which is unable to exist as an autophyte. The vegetative organ of the plant is represented simply by a tuberous rhizome. It forms mycorrhiza with the mycelium of *A. mellea*, or, as it is often called, *Rhizomorpha subterranea*. Tubercles cultivated in pots with sand, loam, or humus soil produced numerous offshoots, but none of them ever reached the flowering stage. The saprophytic development of the fungus reduces the vegetative organs of the orchid, and flowering stalks are produced. It was found that only when the mother tuber contains mycorrhiza does it develop a full-grown offset, which remains dormant during the winter and develops the inflorescence axis the spring of the next year.

The fungicidal action of bulbs of orchids, N. BERNARD (*Ann. Sci. Nat. Bot.*, 9. ser., 14 (1911), No. 4-6, pp. 221-234, figs. 3; abs. in *Bot. Gaz.*, 53 (1912), No. 3, pp. 267, 268).—The fact that certain orchid bulbs have been found free from fungi while the roots contained mycorrhiza led the author to a study of the phenomenon of the fungus not passing from the roots to the succulent bulbs.

Fragments of bulbs were placed in tubes containing cultures of fungi isolated from various orchids. The growth was inhibited wherever the fungus came in contact with the fluids given off from the bulbous material.

The conclusion is reached that the bulbs from some orchids contain a substance of a fungicidal nature that may be considered comparable to a diastase. It is readily diffusible and is destroyed at a temperature of 55° C. The action is considered specific and is held to confirm the hypothesis of the author regarding the symbiosis with mycorrhizal fungi, while protecting the main body of the plant against invasion (E. S. R., 22, p. 722).

Effects of Roentgen rays on micro-organisms and ferments, H. GÜNTHER (Güter. Naturhist. Ver. Preuss. Rheinlande u. Westfalens, 1910, No. 1, Sect. B, pp. 11, 12; abs. in Bot. Centbl., 116 (1911), No. 24, p. 614).—A brief note reviewing the literature on this subject, most of which is declared to show negative results.

Nitrogen-fixing bacteria in leaves of Rubiaceae, F. C. VON FABER (Adv. print from Bul. Dépt. Agr. Indes Néerland., 1911, No. 46, pp. 3).—The author presents a preliminary report of investigations in progress, from which he is able to give results and conclusions in substance as follows:

The plants of this group bearing these bacteria may be outwardly known by peculiar knotty thickenings of the leaves filled with bacteria. Garden species so affected are *Pavetta indica*, *P. lanceolata*, *P. angustifolia*, *P. zimmermanniana*, and *Psychotria bacteriophila*. Bacteria are found in the growing points and from there supposedly extend with the growth of the plant, being found in the buds, flowers, fruit, and seeds. In the young bud leaves the stomata open abnormally early and the massed bacteria press into the leaf interior, loosening the cellular structure and causing characteristic cytological changes which result in the production of a characteristic bacterial tissue. In this a considerable number of starch grains appear, supposedly to serve nutritive purposes for the bacteria.

Already bacteria have been isolated by culture from *P. indica* and *Psychotria bacteriophila*, one species only from each. The bacteria of Rubiaceae seem to show great similarity among themselves and may be adapted forms of one original species. The author thinks that these bacteria play the important rôle in the life of the plants in which they live of fixing atmospheric nitrogen, and claims that this conclusion is supported by the experimental evidence thus far obtained. This work of fixation is thought to be limited to the bacterial leaf galls where the bacteria are present in largest numbers and where the nitrogen is present mainly in the form of protein.

Nitrogen fixation by fungi in relation to nitrogen nourishment, G. STAHEL (Jahrb. Wiss. Bot. [Pringsheim], 49 (1911), No. 4, pp. 579-615; abs. in Bot. Centbl., 119 (1912), No. 1, pp. 9, 10).—These experiments were undertaken for the purpose of finding, if possible, new cases of nitrogen fixation by fungi and of studying the relation of nitrogen assimilation to nitrogen content in their food supply.

The organisms belonged for the most part to the so-called imperfect fungi, 54 species being investigated. In case of a nutrient solution containing 0.0001 per cent of nitrogen, it was found possible to divide the fungi into groups, the first of which, containing 25 species, showed no growth but much oil and was entirely sterile; the second, comprising 22 species, showed better but slight growth and considerable oil, and was almost or quite sterile; a third group of 5 species showed relatively good growth, very good fruiting, and but little oil. Of the 9 species which showed nitrogen fixation 4, it is claimed, had not before been credited with that power. These are *Botrytis cinerea*, *Bispora molinioides*, *Epicoecum purpurascens*, and *Melanomma* sp. Three fungi were found to contain nitrogen as compared with the amount in the nutrient solution in the ratio of 1:1, while one showed a ratio of 1:4. These ratios, it is stated, tend to rise with an increase of nitrogen content in the substratum.

Nitrogen assimilation and a new hypothesis of the first stages of protein formation. O. BAUMISCH (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 20-25, pp. 520-540).—Continuing previous work (E. S. R., 25, p. 435) the author presents in detail his further studies regarding the steps and agencies in nitrogen assimilation and his hypothesis of a photo-chemical agency in connection therewith. He claims that these studies show results confirmatory of the hypothesis.

Protein synthesis in lower plants. K. PUZIEWITZSCH (*Biochem. Ztschr.*, 33 (1912), No. 1-2, pp. 1-13).—This is an investigation of the relative availability of different nitrogen compounds for the synthesis of protein. Proceeding upon the assumptions (1) that such synthesis may be judged with a degree of accuracy from the amount of carbon dioxide produced, as a measure of the energy required in the oxidation of the nitrogen compounds, and (2) that the less available require the more energy, the author cultivated *Aspergillus niger* on a suitable substratum in numerous experiments, employing different compounds of nitrogen as nitrogen sources. The weight of carbon dioxide evolved in each experiment was compared with the dry weight of mycelium so employed and the ratios so found were then compared.

The results obtained are said to show that the employment of energy in protein synthesis is least when the amino acids are used as sources of nitrogen. In case of ammonia salts, and particularly of the nitrate, it is considerably greater. From this fact (supported by other observations and inferences) the author concludes that the amino acids are the best sources of nitrogen for protein synthesis.

A physiological study of nitrate-reducing bacteria. E. B. FRED (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 13-19, pp. 421-440 pls. 6, figs. 9).—Details are given of an extended investigation of 4 bacteria, *Bacillus fluorescens liquefaciens*, *B. pyocyaneus*, *B. denitrificans*, and *Bacterium hartlebii*, in regard to their reducing activity as influenced by such factors as energy supply, presence of nitrites and indicators, and occurrence of certain reactions.

Potash requirement by the nitrogen bacteria. I. VOGL (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 13-19, pp. 411-421).—This is a resumption of work previously undertaken by the author in connection with M. Gerlach (E. S. R., 15, p. 449). It is claimed that the results of the experiments now reported confirm the conclusions resulting from the earlier series, namely, that a certain development of the bacteria and nitrogen fixation may occur in the absence of potash compounds from the nutrient solution, but that the intensity, both of growth and of nitrogen assimilation, is greatly increased by its presence in suitable quantity.

Ammonia and nitrates as a nitrogen source for mold fungi. G. E. RITTER (*Ber. Deut. Bot. Gesell.*, 29 (1911), No. 3, pp. 570-577).—In continuation of a previous study (E. S. R., 22, p. 724), investigations were carried out with *Cladosporium herbarum*, *Mucor racemosus*, and *M. spinosus*, as a result of which the author claims that the nitrate-assimilating fungi are quite commonly able under suitable conditions (in neutral or alkaline culture solutions) to reduce nitrates to nitrites as a first step in such assimilation. This view is held to be supported by the observation that the nitrites can also be utilized as a source of nitrogen.

Anaerobic decomposition of protein and intramolecular respiration in plants. E. GODLEWSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B*, 1911; Nos. 8, pp. 623-704, fig. 1; 9, pp. 705-717).—Attempts were made to determine by experiments with seeds of white and of blue lupines in air-free containers the relation of dependence, if any, which exists between these two processes. The conclusions drawn by the investigator from the final analyses are briefly as follows:

Anaerobic decomposition of protein in seeds of lupines in water or in sugar solutions is entirely independent of the intensity of their intramolecular respiration. Both these processes are affected by the dissolved sugar, however, which decreases the former, but increases the latter process. The former, moreover, goes on long after the latter has ceased, even after the seeds have been killed by suffocation.

It follows, according to the author, that anaerobic decomposition of protein in lupines is an enzymatic process. In the early stages of the experiments albumose and peptones were broken down; later the more complex proteids. In the living seeds the protein decomposition appears to be proportional to the time of its duration; after their death, to the square root of the time. Intramolecular respiration in the glucose solution appears to go on in the lupine seeds alike whether resting or sprouted, which fact is taken to indicate that no new synthesis of zymase occurs during germination; but in water alone this process is at first much more rapid in the sprouted seeds, which phenomenon is attributed to the hydrolysis of the reserve material in the seeds and not to increase of zymase. Pepsin is also supposed to form during germination. Citric acid added to the solutions was not utilized in intramolecular respiration, but appears to decrease it and to shorten its period.

The nutrition of some epiphytic Bromeliaceae, C. PICADO (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 9, pp. 607-609).—As the result of a study of a number of species of epiphytic bromelias, the author claims that they absorb not only their mineral, but also their proteid and other substances from the vegetable and animal detritus held by their leaves. It is possible that these are the only plants the nutrition of which depends entirely upon the detritus collected in the depressions at the base of the leaves.

On the origin of carbon assimilated by plants, L. CAILLETET (*Compt. Rend. Acad. Sci. [Paris]*, 152 (1911), No. 19, pp. 1215-1217; *abg. in Bot. Centbl.*, 119 (1912), No. 2, p. 35).—Studies on *Adiantum*, *Aspidistra*, and other plants habitually growing in rather dense shade are reported, in which it is shown that their photosynthesis was not sufficient to account for the carbon present in their structures. Experiments showed that these plants obtained a part of their carbon from the soil, indicating that they have two sources of carbon, the carbon dioxide of the air and the organic compounds of the soil.

Chlorophyll in plants and colloidal chlorophyll, A. HERLITZKA (*Biochem. Ztschr.*, 38 (1912), No. 3-4, pp. 321-330).—The author has attributed the displacement of the absorption bands in spectra of living leaves toward the red end (as compared with those of solutions of chlorophyll in alcohol, etc.) to the supposedly colloidal condition of chlorophyll in a gelatinous solvent, and this is a study of colloidal solutions of chlorophyll prepared from spinach, carried out with the aim of throwing light on the condition of chlorophyll as it exists in living plants.

He concludes that in expressed leaf sap the chlorophyll is held in a different state from that in case of ordinary solutions, and asserts that it is the same as in colloidal chlorophyll solutions. This colloidal solution shows the presence of a dispersoid, while it is still a question whether this may be said of a solution of chlorophyll in alcohol or acetone. Such colloidal chlorophyll is stated to be an electronegative colloid, unstable and easily forming a flocculent precipitate. The difference between the spectrum of chlorophyll dissolved in alcohol and that of the chlorophyll in leaves, expressed sap, etc., is declared to be attributable to the fact that in the latter case the chlorophyll is in the colloidal state not as a genuine colloid, but as a dispersoid. The identity of the chlorophyll in leaves with that in colloidal solutions is admittedly not yet fully established.

Studies on anthocyanin, III, V. GRAFE (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl.*, 120 (1911), I, No. 6, pp. 765-810, figs. 2).—In studies on the coloring matter of Pelargonium, the author was able to separate the material studied into two main parts, one, deep yellowish-red and crystallizable, the other, brown-red, drying to an amorphous mass. He considers the latter probably a decomposition product of the former. Further particulars of a microscopic and chemical study and of their relations to known compounds are given.

Investigations on the origin of alkaloids in plants, G. CIAMICIAN and C. RAVENNA (*Ann. Chim. et Phys.*, 8. ser., 25 (1912), Mar., pp. 404-421).—Experiments were made by inoculating tobacco and Datura, plants which contain known alkaloids, with solutions of various nitrogenous and nonnitrogenous compounds. The experiments are not considered extensive enough to demonstrate the origin of the alkaloids, but they are thought to indicate that the amido acids play an important part in their synthesis. In general, pyridin and ammonia exerted little influence in increasing the total alkaloids, while the injection of asparagin resulted in a great increase. Glucose increased the nicotin content of tobacco plants, while phthalic acid reduced the alkaloid content.

In connection with these investigations it was found that the alkaloids increased in the check plants that were simply wounded without the injection of any substance.

The tannin-colloid complexes in the fruit of the persimmon, F. E. LLOYD (*Biochem. Bul.*, 1 (1911), No. 1, pp. 7-41, pls. 3).—From further studies on tannin in fruits (*E. S. R.*, 25, p. 28), it is concluded that the explanations heretofore given concerning the fate of tannin during the process of ripening in the date and the persimmon are inadequate. The author claims that tannin as such is not insoluble, but that it has in large part combined with an associated colloid to form an insoluble colloidal complex. Evidence for this has been found in the behavior of the tannin-mass in relation to free tannin and chemical reagents. The tannin-mass is claimed to have an internal structure, consisting of a system or complex of canals, spaces, etc., which have a definite existence. Their behavior during the maturing of the tannin cell and their forms are described in considerable detail. The material called the tannin-mass is a tannin-colloid complex, the second portion of which appears to be a cellulose mucilage. During the course of ripening of the fruit the amount of free or soluble tannin is reduced, and as long as any is present it may escape from the tannin-mass. The view is advanced that during ripening the supposed cellulose mucilage increases in quantity and that eventually sufficient forms to engage most of the tannin.

Influence of iron on the growth of certain molds, B. SAUTON (*Ann. Inst. Pasteur*, 25 (1911), No. 12, pp. 922-928; *abstr. in Rev. Sci. [Paris]*, 50 (1912), I, No. 11, pp. 336, 337).—A study was made of a number of species of *Aspergillus*, *Penicillium*, *Mucor*, *Rhizopus*, and *Racodium* grown in Raulin fluid in the absence of any iron salt. *Aspergillus* and *Penicillium* did not increase in weight to any appreciable extent, while the other fungi seemed to be able to grow in the absence of iron.

It is observed that the simultaneous presence of iron and oxygen seems essential for the formation of spores; they always appeared in the parts of the culture which had the greatest access to the air. Spore formation seems to be accompanied with the fixation of oxygen, and this is probably brought about through the action of the iron.

The extraordinary sensitiveness of *Aspergillus niger* to manganese, G. BERTRAND (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 9, pp. 616-618).—

The author shows that *A. niger* is sensitive to 1 part in 10,000,000,000 of manganese. On account of this great sensitiveness the author calls attention to the necessity for the use of chemically-pure substances in culture media. The ordinary iron sulphate of commerce is said to contain from 0.2 to 0.5 part in 1,000 of manganese.

The poisonous action of oxalic acid salts and the physiological action of calcium, D. LOWE (*Biochem. Ztschr.*, 38 (1912), No. 3-4, pp. 226-243).—As a result of this extension of his former investigations, now made on seeds, shoots, and roots of several cultivated plants, on the leaves of aquatic plants, and on various algae and fungi, as well as lower water animals, the author announces that potassium oxalate exerts a poisonous influence upon the most diverse plant forms (exclusive of the lowest algae and fungi which also require no calcium). A relation is argued between the physiological significance of calcium compounds and the injurious effects of oxalates. Observations show that the injurious reaction of the latter manifests itself in the cell nucleus and the chloroplasts, from which he infers the presence of a compound of calcium in such vegetable cells (as in lower animal cells which exhibit physiological analogies in this respect).

Effects of basic compounds on seedlings and on the lower organisms, T. БОКОВЫЙ (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 20-25, pp. 537-605).—The author, in pursuance of previous studies (E. S. R., 25, p. 433), investigated the influence of various dilute basic compounds on the development of seedlings and of micro-organisms. It was found that, while solutions of 0.01 to 0.25 per cent prevented or retarded development in case of nearly all compounds studied, ammonium chlorid exerted the most deleterious effect, and that such effect was noticeable in the very lowest concentrations of this salt tested.

Movement of minerals in autumn leaves, E. RAMANN (*Landw. Vers. Stat.*, 76 (1912), No. 3-6, pp. 157-164).—The author's analyses, at suitable intervals, of leaves of beech, oak, hazel, and birch, led him to conclude (1) that, in the normal dying of leaves in autumn, there is a considerable movement of proteins from the leaves to the stem; (2) that the movement of potassium and the movement in considerable quantity of phosphoric acid in the same direction seems to be influenced by the nourishment of the stem; (3) that lime and silica about double in quantity in the leaves before death; (4) that these transfers take place during the short period of yellowing and dying; and (5) that these exchanges are more significant in the life of the plant than has commonly been held by investigators.

Mineral movements on freezing of leaves, E. RAMANN (*Landw. Vers. Stat.*, 76 (1912), No. 3-6, pp. 165-167).—Continuing the above studies, the author reports upon the effects of freezing the leaves of oak, pine, and fir on the translocation of mineral substances. The partial freezing of the foliage, October 18, 1909, made it possible to compare not only injured and uninjured leaves of the same tree but also frozen and unfrozen parts of the same leaves.

As a result of his comparative analyses of the ashes of leaves taken while living and of frosted leaves, he reports (1) that both the protein and the sulphur contents of the leaves remained unchanged on freezing; (2) that potassium and phosphoric acid were considerably decreased; (3) that calcium was added in large quantity as in regular autumn dying of leaves; and (4) that these changes occurred in the very short interval between thawing and drying out, which fact is pointed to as an illustration of the possibilities of rapid transportation in dying or dead leaves.

Smoke, fumes, and cultivated soil (*Rev. Sci. [Paris]*, 59 (1912), I, No. 10, pp. 311, 312).—Brief reference is made to investigations by Wieler on the

injurious effect of smoke and factory fumes on soil and vegetation in the region of Aix-la-Chapelle.

It was found that the factory fumes contained sulphuric, sulphurous, and hydrochloric acids, which dissolved the lime of the soil and thus rendered the soil increasingly acid and interfered with the bacterial activity of the soil, particularly nitrification. Liming corrected this condition and prevented destruction of plant growth in case of forest trees. The chestnut appeared to be one of the most resistant trees to acid fumes. In addition to the harmful effect on the soil, the fumes occasionally caused direct injury by corrosion and by deposit of soot on the leaves.

Premature fall of flower petals, H. FITTING (*Jahrb. Wiss. Bot. [Pringsheim]*, 49 (1911), No. 2, pp. 187-263, figs. 3; *abs. in Ztschr. Bot.*, 4 (1912), No. 2, pp. 131-133).—This is a detailed account of the author's study of the casting of fresh and even of very young petals of *Geranium pyrenaicum* and several other plants found to be highly sensitive to certain influences unfavorable in this respect. Among these influences are gases and vapors in the atmosphere, particularly illuminating gas, carbon dioxide, tobacco smoke, chloroform, ether, and hydrochloric acid; high temperature, agitation, and dryness; and wounding of the petals.

Some very sensitive plants showed reaction to the unfavorable stimuli within a few seconds. The fall of the petals occurred after periods varying from a few minutes to several hours. Further studies are contemplated. A bibliography is appended.

Bud mutations of *Solanum maglia*, E. HECKEL (*Compt. Rend. Acad. Sci. [Paris]*, 153 (1911), No. 7, pp. 417-420).—In continuation of a previous note (*E. S. R.*, 20, p. 733), an account is given of a bud mutation of *S. maglia* produced by heavy manuring in conjunction with the use of artificial fertilizers.

In 1910 the author obtained 5.5 kg. of tubers of the mutating form, most of which were of a reddish violet color. These tubers were planted in April, 1911, and produced a considerable crop, many of the individual tubers weighing from 350 to 380 gm. and some of the hills yielding as much as 2 kg. The plants appeared completely free from fungus diseases.

Attention is called to some of the variations which have apparently become fixed in this form, and the author notes the occurrence of violet colored tubers both in this species and in *S. commersonii*. This is thought to indicate that the contention that the Giant Blue, a well-known variety of *S. tuberosum*, is the same as the mutant of Labergerie is not correct.

A study of hybrids between *Nicotiana bigelovii* and *N. quadrivalvis*, E. M. EAST (*Bot. Gaz.*, 53 (1912), No. 3, pp. 243-248, figs. 4).—Studies of these species of *Nicotiana* have been carried through several generations, and the author has discovered 2 elementary species of *N. bigelovii*. In one the capsules are 2-celled and selection of individuals has not increased the number, while in the other species there is a tendency to more than 2 cells in the capsule, which tendency is always transmitted.

The author believes that the species *N. quadrivalvis* and normal *N. bigelovii* are alike in all specific characters except the number of cells, and since they give fertile hybrids it is proposed that the first species should be considered a variety, its name being *N. bigelovii quadrivalvis*.

A retrogressive metamorphosis artificially produced, S. ALEXANDER (*Rpt. Mich. Acad. Sci.*, 13 (1911), p. 198).—The author states that occasionally matured flowering buds of the peach inserted in a stock by bud grafting will develop, in which case the peduncle increases to a length of 5 or 6 in., the sepals grow to the size and length of full-sized leaves, and the petals and stamens are

also greatly modified. If these flowers are permitted to develop further they will send out buds which will ultimately grow into a branch.

The influence of the seed upon the size of the fruit in *Staphylea*, I. J. A. HARRIS (*Bot. Gaz.*, 53 (1912), No. 3, pp. 204-218, figs. 4).—The author has found that the length of the fruit and the number of ovules formed, as well as the seeds developing, are interdependent, and often very closely so. The correlation for length and number of seeds per locule is higher than that for length and number of ovules per locule. These two facts taken in conjunction indicate a physiological relationship between the length of the fruit and the number of seeds developing.

FIELD CROPS.

The relation of electricity to vegetation and agricultural products, A. BERTINI (*Azione dell' elettricità sulla vegetazione e sui prodotti delle industrie agrarie*. Milan, 1912, pp. XVI+459; rev. in *Agr. Mod.*, 18 (1912), No. 5, p. 73).—This work is divided into 4 parts, the first of which deals with atmospheric electricity, and the second with ancient and modern observations of the rôle of electricity in plant physiology. The third part deals with the effect of electricity on the germination of seeds and the development of plants, proceeding in chronological order from 1746 to 1911, and states the results of some hitherto unpublished experiments. The fourth part presents the results of studies of the effects of X-rays on the causes of fermentation in must, wine, vinegar, alcohol, butter, milk, eggs, and other agricultural products.

Electroculture at Halle, J. KÜHN (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle*, 1911, No. 20, pp. 219-227).—The author quotes some results obtained by Lodge and cites experiments conducted by Breslau at Kryschanovitz in 1903, in which electrical influence apparently increased the yield of strawberries 128 per cent, of sugar beets from 120 to about 140 per cent, and of barley and beans about 32 per cent.

In some of the author's experiments one-third of each plot of a fertilizer test with clover was influenced by electricity, one-third left uninfluenced, and the middle third used as a buffer. The middle third excelled either of the others, and the electrified third gave somewhat the lowest average hay yields.

In the remainder of his experiments the fertilizer plots were divided into only 2 parts. Unelectrified and nonirrigated rye averaged 6.6 per cent more straw and 11.2 per cent more grain than the electrified portions of the plots. There were apparently slight increases of potato yields on the electrified portions of plots except under irrigation, where the unelectrified crop produced a markedly heavier yield with a somewhat lower starch percentage. In case of mangels the electrified crop gave 9.96 per cent more roots and 8.06 per cent more leaves than the unelectrified crop, while electrified sugar beets gave considerably higher yields of roots which also stood somewhat higher in sugar percentage on both irrigated and nonirrigated plots. Under irrigation, barley, rye, winter wheat, and summer wheat gave about the same grain and straw yields whether electrified or not.

The influence of root development on the tillering power of cereals, A. E. PARR (*Agr. Jour. India*, 7 (1912), No. 1, pp. 73-78).—The author states briefly some results obtained by planting cereals in accordance with the Demtschinsky and Zehetmayr methods. The Demtschinsky method, as described, consists of transplanting young plants in such a way as to leave them from 1½ to 2 in. deeper in the ground. This leaves the lowest nodes beneath the surface and causes the development of adventitious roots. Yields of 8,000 lbs. of rye and an initial saving of 75 per cent of the seed usually required are claimed for

this method. The Zehetmayr modification of this system consists of sowing in furrows which are later filled in around the plants instead of transplanting.

Although the author's work with wheat in India along these lines was destroyed by ants, he says that corn planted in furrows about 5 in. deep gave about 1½ times as great yields as that sown on the level.

Earthing up was also tested for somewhat similar purposes, but gave lower results than deep transplantation.

The Demtschinsky hilling method, N. DEMTSCHINSKY (*Deut. Landw. Presse*, 38 (1911), No. 25, p. 293, fig. 1).—The author outlines the Chinese method of hilling small grains for moisture conservation and the development of the root system. He recommends an implement manufactured in Magdeburg with which a man and horse can hill from 6 to 7 hectares (14.82 to 17.29 acres) of grain per day.

Insuring increased yields—the theory and practice of the Demtschinsky methods for growing small grains, N. A. and B. N. DEMTSCHINSKY (*Die Vervielfachung und Sicherstellung der Ernteerträge, Theorie und Praxis der Ackerbeekultur*. Berlin, 1909, pp. 116, pls. 12, figs. 10).—A discussion of the theory underlying the authors' new methods is followed by directions for their use in grain growing and a statement of the results of tests and observations at Torbino and of other tests of transplanting and hilling methods.

[Tests of the Demtschinsky method], G. BOHUTINSKY (*Illus. Landw. Zig*, 31 (1911), Nos. 3, pp. 13, 14; 5, pp. 29-31, figs. 3).—The author summarizes the results of experiments with winter wheat, winter barley, and oats conducted in 1909-10. Tables state in detail the results obtained by the ordinary method, and the deep sowing, hilling, and Zehetmayr modifications of the Demtschinsky method.

From the data presented the author concludes that hilling produces a greater production per plant which may compensate for the loss due to thinner seeding. The use of the Demtschinsky method prolonged the vegetation period by from 3 to 8 days, but increased the danger from rust. The new methods gave a higher yield per plant but not per acre than the ordinary method. The deep planting method gave negative results.

Tests of the new grain cultural methods of Demtschinsky and Zehetmayr, O. LEMMERMANN ET AL. (*Landw. Jahrb.*, 41 (1911), No. 2, pp. 163-256).—These tests were conducted at Hohenheim on the experiment fields of the Royal Agricultural High School of Württemberg. The author states in tables the results obtained since 1908 in work with winter rye, barley, wheat, and oats, as well as with some summer varieties.

From the data presented he concludes that thin sowing resulted in unusual tillering, but no marked difference appeared in the tillering of grains that were hilled or planted more deeply than usual. The use of the Zehetmayr method resulted in tillering about midway between that following the Demtschinsky and the ordinary methods. Tillering was most affected in case of winter barley, less so in case of winter rye and winter wheat, and least of all in case of summer barley.

Both methods apparently retarded ripening by from 3 to 10 days. The Demtschinsky method resulted in a greater retardation than did the Zehetmayr, but if the plants were more deeply set later a more regular development of the straw, and therefore a more regular ripening of the grain, was attained than if this work were left undone. The Demtschinsky method more effectively prevented lodging, the Zehetmayr method accomplishing this to a lesser degree.

The grain and straw yields per plant were effectively raised by the Demtschinsky method as compared with the ordinary method, especially in case of winter barley. The Zehetmayr method gave results midway between. The

Demtschinsky method gave lower yields when hilling and transplanting were resorted to than when they were omitted. The Demtschinsky method and to a less degree the Zehetmayr method increased the percentage of grain, the 1,000-kernel weight, and the size of kernel. All things considered, the author believes that on the heavy clay soil used in the test only the Zehetmayr method compared favorably with carefully conducted drilled seeding by the older method. He regards transplanting as impractical for extensive agriculture, and states that it brings lower yields than the ordinary drill seeding method.

Compilation of the results of tests of the Demtschinsky, Zehetmayr, and other cultural methods and their variations, A. EINECKE (*Landw. Jahrb.*, 41 (1911), No. 2, pp. 281-335, fig. 1; *abs. in Jour. Bd. Agr. [London]*, 18 (1912), No. 10, pp. 857-859).—This article is compiled from reports transmitted by the minister of agriculture of the Prussian Agricultural Chambers to the experimental and bacteriological institute of the Royal Agricultural High School. Much of the data presented has already been published, and has been noted from other sources.

The results obtained in these experiments, which were carried out in Germany, agreed fairly well, indicating that transplanting and deep setting of cereals is unprofitable. Although Demtschinsky estimates that from 16 to 20 days' labor per acre is sufficient in the use of this method, the extra labor required in these experiments varied from 53 days per acre in Pomerania to 120 days in Wiesbaden.

The results favored hilling up the plants in rows and indicated that this method prevented lodging without involving much extra labor. A special machine was used in planting. The effect of these treatments varied somewhat with the different cereals. Both earthing up and transplanting were favorable in case of winter rye on sandy and clay soils, but winter wheat was less favorably affected and the tests on spring rye were unsuccessful. Both these methods gave good results in 2 experiments on spring barley, but the results with oats were too variable to justify definite conclusions.

In general the Demtschinsky method resulted in longer heads and a greater production of grain per plant than the ordinary methods, and although unsuccessful financially, it drew the attention of German agriculturists to the possibilities of deep plowing and earlier, thinner seeding.

Tests of new grain culture methods, R. FROUWART (*Wiener Landw. Ztg.*, 61 (1911), No. 33, pp. 335-337).—This is a report of experiments conducted to determine the merits of hilling up wheat, rye, and barley, and of covering the small plots with soil, as compared with the ordinary cultural methods. Tables state the weight of grain per 100 heads, the 1,000-kernel weight, the proportions of the kernels which passed through sieve meshes of various sizes, and the depth of drilling and covering.

In view of these and other tests the author does not feel that the recent severe criticism of these methods is any more justified than the earlier enthusiasm. He does not recommend any diminution in rate of seeding when they are used.

[Experiments with field crops], G. AUCHINCLOSS (*Imp. Dept. Agr. West Indies, Rpts. Bot. Sta. [etc.] Grenada, 1910-11*, pp. 4-6).—In experimental sowings of *Crotalaria retusa*, indigo, Bambarra ground nuts (*Voandzeia subterranea*), *Tephrosia candida*, and the sword bean (*Canavalia gladiata*), only the last named germinated well under a cacao shade. Variety tests of sweet potatoes, yams, and tarlas are reported. The quantity of seed set on both lined and unlined rows of alfalfa was negligible, and no apparent increase resulted from the tripping of alternate rows.

[Field crop tests in the Fiji Islands], C. H. KNOWLES (*Rpt. Agr. Fiji, 1910*, pp. 8-11).—Brief reports are given on work at the Lautoka Station with cotton planted continuously, and cotton planted after corn, rice, and green manure crops. The cost of lint per pound ranged from 8s. 9d. to 13s. 8d. Other work reported included a fertilizer test with cotton, a date of cutting test with sisal hemp, a variety test of corn, and a test of a rice huller and polisher. The cost per bushel of growing corn of the 4 varieties tested ranged from 1s. 2d. to 2s. 2d.

[Variety and other tests], J. W. HADFIELD (*Agr. Gaz. N. S. Wales, 23* (1912), No. 2, pp. 115-121, figs. 5).—Tests of varieties of wheat, oats, and mixed sowings of harley with rape and vetch are reported. Barley and rape proved the most effective winter mixture.

[Tests of new grasses], J. DUNCAN (*Jour. New Zeal. Dept. Agr., 4* (1912), No. 2, pp. 111, 112).—*Festuca dumetorum* is noted as giving special promise of proving a valuable grass at Kaitata and Okerama in the Whangarei district. Other grasses tested were *F. arenari*, *Agropyrum smithii*, *A. repens*, *Phalaris commutata*, *P. caroliniana*, *Paspalum dilatatum*, *P. virgatum*, and *Chloris gayana*.

The influence of time of cutting upon the yield and composition of hay, C. CAWTHRE and A. G. RUSTON (*Jour. Agr. Sci., 4* (1912), No. 3, pp. 305-317).—The author presents mechanical and chemical analyses of the soil of the Yorkshire farm on which the hay used in these experiments was grown in 1909-10. The hay was a mixture of rye grass and rib grass with various clovers.

In 1909 the first cutting was made June 10 when the rye grass was in full flower and later cuttings on June 23, July 15, and August 3. Analyses of the hay indicate that the proportion of crude fiber increased steadily throughout the entire period, that the proportion of amids fell gradually up to the third cutting after which the reduction was very pronounced, and that a fall in proportion of true protein during the moist latter half of June was followed by a steady rise up to the time of the fourth cutting. The proportion of carbohydrates gradually fell after the second cutting, but the proportion of pentosans was relatively high throughout the period. The ash increased in richness in silica, but the proportion of potash and phosphoric acid tended to fall. Tables state in detail the numerical data obtained in the tests, and the author concludes from the 2 years' work that the nature of the changes depends upon the character of the season.

In 1909, when the season favored steady growth, the production of protein and fiber was steady and the assimilation of each of the ingredients, particularly silica, was considerable. In 1910, a severe climatic setback in the latter part of June was followed by an almost complete suspension of growth and notably of protein production. During both seasons there was a steady fall in the digestibility of hay, which in the end more than counterbalanced the increase in yield.

The best results followed cutting about July 1, but a latitude of a week or 10 days "may be allowed, however, without very seriously impairing the nutritive value of the crop." After July 15, however, appreciable deterioration occurred.

Tests on natural pastures, C. DUSSENET (*Ann. Agr. Suisse, 12* (1911), No. 2, pp. 155-162).—These pages report the results of fertilizer tests on natural pastures conducted for a number of years at each of several points in the cantons of Neuchâtel and Valais, Switzerland.

Applications of (1) 576 kg. per hectare (512.64 lbs. per acre) of 14 per cent Thomas slag, (2) 240 kg. per hectare of 60 per cent chlorid of potash, and (3) the 2 applications together ranked in the order named in one locality as to net profits. In another locality applications of (1) 400 kg. of a 30 per cent potash salt, (2) 480 kg. of 17 per cent superphosphate, and (3) the 2 applications to-

gave crops containing 11.3, 10.7, and 12 per cent of protein, respectively, as compared with 10.5 per cent for the crop grown on the check plot. The net profits in this locality, were lowest in case of the application of potash alone and highest in case of the mixture.

Nitrogen fertilization of legumes, G. RITTER (*Centbl. Bakt. [etc.], 2 Abt., 29 (1911), No. 23-25, pp. 650-668, pls. 2*).—The author briefly reviews earlier experiments on the subject and states at length the plan and results of his own tests with lupines.

He concludes that uninoculated virgin soil should be fertilized with nitrates or ammonium salts. A small amount of some nitrogen-supplying fertilizer should be added even when inoculation with pure cultures is practiced, but the best results are obtained by inoculation with soil from fields in which lupines have grown.

The soy bean and cowpea, C. G. WILLIAMS and F. A. WELTON (*Ohio Sta. Bul. 237, pp. 241-261, figs. 2*).—Discussions of the uses of soy beans and cowpeas accompany directions for growing and harvesting the crops in Ohio.

Seeding soy beans at the station at the rate of 3 pk. per acre produced higher total and higher grain yields than seeding at the rate of 1, 2, or 4 pk. per acre in rows 28 in. apart. Seeding at the rate of 8 pk. per acre in rows 8 in. apart produced a still higher forage yield but the difference was insufficient to pay for the extra seed used. The forage was more satisfactory because of fineness of stems. Sowing at the rate of 3 pk. per acre also gave the highest grain yield in a farmer's cooperative test.

Tables present descriptions of 32 varieties of soy beans tested and the yields secured during the period 1908-1911. Other tables group these varieties according to the length of the period required to ripen them, and report analyses as to protein and fat of 23 varieties of soy beans and 2 varieties of cowpeas in comparison with other feeds.

During the 3-year period 1909-1911, 10 varieties of soy beans produced average total yields of 3,528 lbs., and grain yields of 23.62 bu. of grain per acre. During the same period 3 cowpea varieties produced total yields ranging from 2,380 lbs. to 3,080 lbs. and grain yields ranging from 4.44 to 7.94 bu. per acre.

Alfalfa as a field crop in South Dakota, A. N. HUME and S. GARVER (*South Dakota Sta. Bul. 133, pp. 259-281, figs. 6*).—Tables state the results obtained in numerous variety tests at Brookings, Highmore, and other points in cooperation with the Bureau of Plant Industry of this Department.

From the data presented, the authors conclude that there is nothing to indicate that the source of the seed used at Brookings had any considerable influence on the hay yield, with the possible exception of the French seed. At Highmore, however, 6 years' average yields indicate that a choice of the proper strain may determine the success or failure. Of the 4 strains that appeared sufficiently hardy for use at this point, "Turkestan proved most able to withstand conditions." It gave an average yield of 1.4 tons per acre during the 6 years.

In a test of strains of *Medicago sativa*, *M. falcata*, *M. media*, *M. ruthenica*, and *M. platycarpa* at Brookings, Highmore, and Cottonwood, plants which have been reset were compared. Almost all the strains tested at Brookings proved sufficiently hardy, but at Highmore a far greater percentage of the reset plants of *M. falcata* survived than of *M. sativa* or even *M. media*. At Cottonwood the surviving plants were practically all either *M. falcata* or *M. ruthenica*.

Hard seed was treated by a machine devised by Nilsson of Svalöf, Sweden. This is called the "Preparator," and consists essentially of a hopper so arranged as to drop the seed upon a revolving disk from which it is thrown by centrifugal force against the concave surface of a circular rough stone within which the disk revolves. On striking the rough surface, the seed coats are in-

dentured or scratched and so weakened that water is more readily absorbed and the seed coat more easily broken by the swelling germ. Treated and untreated seed of *M. sativa* showed germination tests of 90½ and 91½ per cent, respectively, as compared with 94 and 86½ for *M. media*, and 81½ and 82½ for *M. falcata*.

Right- and left-handedness in barley, R. H. COMPTON (*Proc. Cambridge Phil. Soc.*, 15 (1910), No. 6, pp. 495-506, figs. 2).—The author's conception of right- and left-handedness in barley is illustrated in the accompanying figure (see fig. 1).

Observations of 8 varieties of two-rowed barley made to determine the ratio of lefts to rights in the first leaves of seed of different varieties, and of the various kernels from the same individual spikes, indicated that among 12,401 seedlings 7,237, or 58.36 per cent, "had the first leaf twisted in the left-handed fashion." The ratios obtained from the different varieties differed slightly, and "it appears probable that the difference between Plumage corn, and Guinness Goldthorpe, for example, is significant." Right- and left-handedness appeared not to be hereditary.

The same ratio was maintained whether the seed was taken from the odd or even rows of seed on the parent ear. The twist of the last leaf below a spike had no apparent influence on the ratio of right- to left-handed seedlings produced from the spike.

A further contribution to the study of right- and left-handedness, R. H. COMPTON (*Jour. Genetics*, 2 (1912), No. 1, pp. 53-70, figs. 4).—The work reported in this paper confirms the conclusions noted above in the case of two-rowed barley, indicating that "although the ratio of lefts to rights is maintained through 3 successive generations, the kind of asymmetry itself is not inherited." An excess of left-handed seedlings also appeared in six-rowed barley and no conspicuous variation of the ratio of lefts to rights among the

different rows of grain appeared. The numbers examined, however, were too small to be decisive.

A variety of millet (*Setaria italica*) also showed an excess of left-handed seedlings, 54.1 per cent being left-handed. Both stereo-isomeric forms were present in rye. In case of corn the ratio was almost unity (1.010), and there was apparently "no inheritance of right- and left-handedness as such." In case of oats 44.88 per cent of the seedlings were right-handed. The ratios obtained in case of corn kernels varied according to the position of the kernel on the cob, "the seeds on the odd orthostichies giving an excess of right-handed, those on even rows an excess of left-handed offspring" with some exceptions.

The author suggests that the difference in ratios results from a difference in shape of the material enclosing the developing embryo, and rejects as improbable an alternative hypothesis involving somatic segregation of symmetry characters in the gametes.

Chou moeller at Moumahaki (*Jour. New Zeal. Dept. Agr.*, 4 (1912), No. 2, pp. 117, 118, fig. 1).—Although this is the first test of Chou moeller for this purpose at this locality, the author regards it as a decided success as a dry weather forage for milking stock.

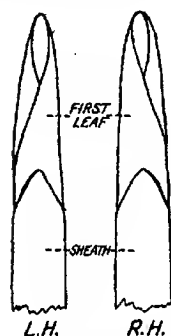


FIG. 1.—Right- (R. H.) and left-handed (L. H.) stereo-isomeric seedlings.

[Root cotton], S. KUSANO (*Jour. Col. Agr. Imp. Univ. Tokyo*, 4 (1911), No. 1, pp. 67-82, pls. 2, fig. 1).—This so-called cotton is a fibrous cork tissue derived from the root of the tropical plant *Fagara integrifolia*. It is at present used in caulking the seams of small boats. It is spoken of as unwettable, but takes up 16.2 per cent of its own weight in water when kept in a moist chamber for a week (maximum temperature 22° C.) or 26.1 per cent when kept in a steam sterilizer for 3 hours and left until the next day, as compared with 15.2 and 20.2 per cent respectively in case of ordinary commercial cotton. Its specific gravity is only about half that of ordinary cotton.

The bast fibers of *Gomphocarpus fruticosus*, A. HERZOG (*Tropenpflanzer*, 16 (1912), No. 3, pp. 115-125, figs. 8).—A brief review of the literature of the subject is followed by a statement of the results of observations of the water content and of the microscopic and other characters of the fibers. Tables state the results of measurements of the cells and micro-photographs show the structure of the fibers.

The origin of cultivated oats, TEABUT (*Buk. Soc. Hist. Nat. Afrique Nord*, 1910, No. 9, pp. 150-161, figs. 5).—This contribution to the study of the origin of cultivated oats deals with *Avena sterilis*, *A. fatua*, and *A. barbata*.

A comparative test of lime-sulphur, lead benzoate, and Bordeaux mixture for spraying potatoes, F. C. STEWART and G. T. FRENCH (*New York State Sta. Bul.* 347, pp. 77-84, pls. 4).—The experiments described were conducted for the purpose of determining the relative merits of lime-sulphur 1:40, lead benzoate (1 lb. to 50 gal.), and Bordeaux mixture (6:6:50) for spraying potatoes.

The authors conclude that "the results indicate plainly that neither lead benzoate nor lime-sulphur can be profitably substituted for Bordeaux mixture in spraying potatoes. Both lack the stimulative influence possessed by Bordeaux while lime-sulphur also dwarfs the plants and lowers the yield."

The Bordeaux rows yielded 100.3 bu. per acre more than the checks, while the benzoate and lime-sulphur rows yielded respectively 6 and 39.5 bu. less than the checks. None of the mixtures burned the foliage, but the lime-sulphur rows were as badly affected with tip burn as were the check rows.

Lime-sulphur dwarfs potato plants, F. H. HALL (*New York State Sta. Bul.* 347, popular ed., pp. 2, fig. 1).—This is a popular edition of the above.

Soy beans, G. ROBERTS and E. J. KINNEY (*Kentucky Sta. Bul.* 161, pp. 107-131, figs. 2).—This is a brief manual of information for the soy bean grower in Kentucky. Notes on a number of varieties tested are given.

Three-year average yields after planting in rows 23 in. apart were not enough higher than those secured from rows 35 in. apart to pay for the extra trouble of cultivation. Sowings of 55 lbs. per acre generally excelled in seed yield those of 30 lbs. per acre.

The soy bean and its uses, A. C. TONNELIER (*La Soja Hispida y sus Aplicaciones*. Buenos Aires, 1912, pp. 16, figs. 4).—This brief manual of information on the soy bean quotes many authorities, and reports an analysis of the "green forage" of the plant and the yield secured in a test which the author regards as favorable to the growth of the plant in his locality.

Tobacco culture in Ohio, A. D. SELBY and T. HOUSER (*Ohio Sta. Bul.* 238, pp. 263-359, figs. 23).—Earlier tobacco work at the Ohio Station has already been noted (*U. S. R.*, 16, pp. 870, 886; 17, p. 245; 18, p. 606). This bulletin discusses the early history of tobacco culture in Ohio, and gives statistical and other studies on its present status and directions for tobacco growing, harvesting, curing, and marketing in that State.

In a rate of planting test the plants were spaced 16, 20, 24 in. etc. up to 40 in. apart in rows 34 in. apart. Those planted 16 in. apart gave the highest yields

per acre of filler, wrapper, and trash. The decrease in yield and in total value per acre resulting from wider plantings was continuous. The most closely planted tobacco was rather flimsy, perhaps because of immaturity and delayed ripening, but the fact that the entire crop was harvested at the same time was probably unfair to the closer plantings as these were somewhat less mature.

During the years 1906 and 1907 the total average gain from suckering as compared with allowing the crop to go without attention until cutting time amounted to 340 lbs. per acre or \$36 per acre. In 1910 the gain amounted to 193 lbs. or \$20.07 for twice suckering, and 247 lbs. or \$24.53 in case of that suckered 3 times.

In tests of time of harvesting Zimmer Spanish tobacco in 1909, that which was allowed to stand 25 and 27 days after topping gave 18.81 per cent greater total weight than that which stood only 20 and 22 days. The gain in wrapper and filler was 13.28 and that in total value 14.23 per cent. In another test tobacco cut 23 and 27 days after topping gave 12.94 per cent greater total weight than that cut 2 days sooner. 9.21 per cent loss in wrapper and filler and 5.56 per cent loss in total value. In a third test a crop which stood 27 days showed 6.61 per cent greater total weight than that which stood only 22 days, 4.44 per cent gain in wrapper and filler and 4.92 per cent gain in total value, while that which stood 32 days showed gains of 10.62, 10, and 10.11 per cent, respectively.

In 1910 cuttings were made 2, 3, 4, 5, and 6 weeks after topping. The increase in yield of wrapper and filler and in total value was continuous up to the last cutting. In case of 3 hybrids cut in part 4 weeks after topping and in part 4 days later distinct gains in yield and value were observed. These hybrids were top suckered just before the first cutting.

Among 34 varieties and hybrids Pennsylvania Broadleaf and Black Seedleaf produced the highest average yields during 1908-1910. Tables indicate also the yields secured in 1910 and the relative merits of hybrids and varieties based upon the yields of their best selections in 1910.

A table presents an itemized statement of the cost of each of 13 operations in connection with growing and marketing tobacco as carried on by 7 Zimmer Spanish growers. The author calls attention to the fact that many factors in cost of production remain constant or nearly so and that the important point is not the cost of production per acre but the production cost per unit of product. He estimates that while the 7 farmers quoted spent \$44.94 on the operations specified and secured average profits of \$47.92, an expenditure of \$60 per acre might bring a profit of \$65 per acre. A table indicates the recommended distribution of the expenditure among the various operations.

Historical and cultural notes on Zimmer Spanish tobacco are followed by briefer notes on a number of other varieties.

[Tobacco varieties and tests in Imosk and Sinj], K. PREISSECKER (*Fachl. Mitt. Österr. Tabakregie*, 11 (1911), No. 2, pp. 63-86, pls. 5, figs. 3; *abst. in Bol. Tec. Cultiv. Tabacchi [Scufati]*, 10 (1911), No. 5, pp. 283-294).—A statement of the principal tobacco varieties grown in Dalmatia and of data obtained in tests of a number of hybrids accompanies discussions of the commercial status of tobacco in Bosnia, Herzegovina, and Japan.

The use of artificial heat in curing cigar-leaf tobacco, W. W. GARNER (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 241*, pp. 25, figs. 4).—This bulletin presents in popular form some results of several years' experiments in the Connecticut valley.

These tests have proved "that by the use of artificial heat the curing can be successfully accomplished during the most unfavorable weather conditions, and methods for accomplishing this end are outlined." Heretofore the application of artificial heat in curing cigar tobaccos has been restricted almost en-

fire to the use of open charcoal or wood fires in curing shade-grown wrapper leaf. Experiments on a commercial scale in cooperation with growers have demonstrated the value of artificial heat in general for curing cigar types. A method of applying heat by the use of a furnace and flues, which has given very satisfactory results, has been worked out in detail.

The topics discussed include the conditions essential to the changes in properties and composition during the process, the prevention of pole-sweat, or pole-burn, the effect of the use of artificial heat on quality, the use of charcoal and flues in curing, and the construction of barns adapted to the use of heat.

[Tobacco hybrid and Mendelian inheritance], V. PAOLINI (*Bol. Tec. Cultiv. Tabacchi [Scalfati]*, 10 (1911), No. 5, pp. 263-272).—The author discusses a local tobacco hybrid with special reference to Mendelian inheritance. This "Salento" hybrid was produced by crossing 2 varieties designated as Kentucky and Cattaro.

[Seed analyses and plant breeding at Zurich], F. G. STEBLER (*Landw. Jahrb. Schweiz*, 26 (1912), No. 1, pp. 16).—This report presents data for 1910 similar to the report already noted (E. S. R., 23, p. 239).

Agricultural observations in North America, with special reference to plant breeding, K. VON RÜMKE and E. VON TSCHERMAK (*Landw. Jahrb.*, 39 (1910), *Ergänzungsbd.* 6, pp. XVI+151, pls. 22).—This is a review of the various lines of research in plant and animal breeding in North America, especially in plant breeding, together with a brief account of the agricultural institutions of the United States and descriptions of typical agencies.

Organization for plant breeding, K. VON RÜMKE (*Ueber Organisation der Pflanzenzüchtung*. Berlin, 1909, pp. 56).—The author discusses the organization of the plant-breeding work conducted in Vienna, Loosdorf, Weihenstephan, Munich, Hohenheim, and Svalöf. References are given to other publications which deal with the work at some of these points.

HORTICULTURE.

Influence of crossing in increasing the yield of the tomato, R. WELLINGTON (*New York State Sta. Bul.* 346, pp. 57-76).—This comprises a study of the effect of cross-fertilizing related tomato varieties on the yield of the hybrid plants. Some of the more important experiments in plant hybridization are reviewed and a bibliography is appended. Suggestions are given for growing hybrid seed.

The experiments were conducted in the summers of 1908-1910 and also in the winter of 1908-9. The first experiment was started with seed from self-fertilized plants of the Livingston Stone and Dwarf Aristocrat and from Dwarf Aristocrat X Livingston Stone, and Dwarf Aristocrat X Hedrick. The yield from the first generation (F_1) seedlings resulted in a marked increase over the yield of the parent forms. Similar results were secured with F_1 seedlings in the summers of 1909 and 1910. The 1908-9 winter experiment comprised a test of F_1 seedlings, all of the dwarf plants that appeared in this second generation being discarded. The results were similar to those secured in F_1 summer tests although the differences in favor of the crosses were much less marked.

The summer experiment in 1909 was conducted with F_1 , F_2 , and F_3 seedlings. The F_1 and F_2 seedlings showed practically the same increase in yield over the parent forms, whereas the yield of F_3 seedlings was nearly identical with the Livingston Stone parent. The experiment in 1910 was continued to the fourth generation of seedlings. The F_1 seedlings gave the highest yield, the F_2 seedlings the next highest, whereas the F_3 and F_4 seedlings both gave yields considerably

lower than the Livingston Stone parent. In all cases the yield of the standard parent was much greater than that of the dwarf parent.

In the light of this and similar investigations here reviewed, the author concludes that the increase in vigor and size produced by crossing is undoubtedly due either to the heterozygous condition, which stimulates the growth of either the size or the number of cells, or to a combination of two or more size-increasing characters, such as thick internodes and long internodes, which dominate over characters of decreasing dimensions. All of the crosses gave consistent gains in favor of the yield of F_1 seedlings. The yields from the F_1 and F_2 seedlings appear to have fallen off in direct ratio to the decrease in the number of heterozygous plants. When, however, a homozygous condition for all the plants in a strain has been obtained, the average yield of the plant should remain constant from year to year, varying only with the external factors. The author further concludes that the results as a whole warrant the production of F_1 generation tomato seed, not only by the growers but by all seedsmen who wish to furnish the best grade of seed to the buyers.

Crossing tomatoes to increase the yield, F. H. HALL (*New York State Sta. Bul.* 346, popular ed., pp. 8).—A popular edition of the above.

Preliminary report on tomato culture, L. L. CORRETT (*Virginia Truck Sta. Bul.* 8, pp. 157-171, figs. 5).—This comprises popular directions for growing tomatoes in eastern Virginia. Consideration is given to propagation, including the use of the hotbed and cold frame; hardening; soil and preparation; planting; spraying; diseases and insects; types of fruit; harvesting and packing; marketing; and canning. Results are also given of varieties tested at the station showing the character of growth, form and color of fruit, date of first ripening, duration of picking period, and number and weight of fruit.

[Phenological notes: Blooming dates for Iowa plants, 1911], CHARLOTTE M. KING ET AL. (*Trans. Iowa Hort. Soc.*, 46 (1911), pp. 200-211).—A continuation of previous reports (*E. S. R.*, 26, p. 237). The records for 1911 are given by a number of observers from different parts of the State showing the dates of first blooming of trees, shrubs, and flowering plants.

The avoidance and prevention of frost in the fruit belts of Nevada, J. E. CHURCH and S. P. FESQVSSON (*Nevada Sta. Bul.* 79, pp. 53, pls. 16).—Part 1 of this bulletin, which deals with the prevention of frost, describes in detail heating experiments conducted by the station in 3 orchards during the spring season of 1911, and discusses methods of preventing frost by the use of wind-breaks and orchard heaters. A brief account is given of frost phenomena and general weather changes, together with a discussion of the methods of forecasting frost, including descriptions with illustrations of the necessary apparatus. Estimates are also given on the cost of orchard heating.

The second part of the bulletin deals with the avoidance of frost. A series of temperature measurements taken in 1910 are given to show the value of higher ground as a natural site for orchards. A temperature survey of the agricultural land of the State has been inaugurated with the view of determining large areas suitable for fruit raising under all forms of economic frost prevention and also to delimit thermal belts in these areas into (1) belts where frost does no material damage to fruit crops; (2) belts where frost can be successfully combated at reasonable expense; and (3) belts where frost is so severe as to make fruit raising unprofitable. A progress report is given of this work, which during the past season included the establishment of 5 different stations in the Truckee Meadows and located at different altitudes. The temperature records secured at these stations are given and discussed. They indicate a preponderance of low temperatures at the lower stations.

A preliminary temperature survey of the State covering the years 1901-1911 and based upon the climatological records of the U. S. Weather Bureau was also made. Descriptions are given of the thermal stations in Nevada with mean temperature observations during the above period, together with similar data for Utah and Colorado. A bibliography on orchard heating, together with suggestions on tree planting by A. A. Heller, is appended.

The authors conclude that orchards in Nevada can be protected, even during a season when the temperature falls as low as 22° F. and frosts occur persistently, at an expense varying from 73 to 95 cts. per tree. Windbreaks consisting of the Russian oleaster, lopped poplars or willows, and Lombardy poplars are recommended as a material aid in economic and effective orchard heating. The windbreaks are essential to success wherever the wind is strong. From the temperature data already secured it is concluded that many sections in Nevada contain areas that can be adapted by orchard heating to the raising of fruit. The Moapa Valley is practically frostless.

Varieties of fruits raised in Oklahoma, N. O. BOOTH and D. C. MOORING (*Oklahoma Sta. Bul.* 95, pp. 3-48).—A descriptive list is given of the varieties of apples, crabapples, pears, quinces, peaches, plums, cherries, grapes, blackberries, dewberries, loganberry, raspberries, strawberries, and gooseberries, which have been tested by growers in Oklahoma. The number of growers who have been successful and those who have been unsuccessful with each variety are indicated.

How to make old orchards profitable, F. A. BATES (*Boston*, 1912, pp. 123, figs. 13).—A popular treatise on orchard renovation.

The apple orchard from planting to bearing age, A. L. DACY (*West Virginia Sta. Bul.* 136, pp. 161-206, figs. 23).—A popular bulletin discussing the various operations involved in planting an apple orchard and in its subsequent care up to the bearing age.

The profitable management of the small apple orchard on the general farm, M. C. BURRITT (*U. S. Dept. Agr., Farmers' Bul.* 491, pp. 22, figs. 8).—This bulletin deals specifically with the renovation of old apple orchards. After classifying the orchards it will not pay to renovate, the details are given for pruning, fertilizing, cultivating, and spraying neglected orchards, including a discussion of the cost and profits from renovated orchards. Important references to the subject of orchard renovation are noted.

The more important insect and fungus enemies of the fruit and foliage of the apple, A. L. QUAINANCE and W. M. SCOTT (*U. S. Dept. Agr., Farmers' Bul.* 492, pp. 48, figs. 21).—This publication, which is based upon the results of the Department's investigations during the past several years, describes the more important insect and fungus enemies of the fruit and foliage of the apple, together with the most economical methods of combating them.

The cherry orchard as a commercial venture, G. R. HEALY (*Trans. Iowa Hort. Soc.*, 46 (1911), pp. 256-259).—Some data are given on the cost of growing cherries on a commercial scale.

A supposed case of parthenogenesis among olives, G. CAMPBELL (*Nuovo Hor. Bot. Ital.*, n. ser., 19 (1912), No. 1, pp. 86-89, pls. 2).—The author reports a case of supposed parthenogenesis observed in an olive grove where abortion of the female flowers occurred quite frequently.

Strawberry notes for 1910, 1911, W. J. GREEN, J. H. GOUBLEY, and P. THAYER (*Ohio Sta. Bul.* 256, pp. 211-239, figs. 56).—This bulletin contains notes on the condition and character of strawberry varieties tested at the Ohio Station during the seasons 1910 and 1911. Many of the varieties are illustrated. Lists are given of promising varieties for market, dessert, and canning, and for high yield and long-season fruiting.

A test of a number of autumn fruiting varieties indicates that the smallness of the fruit renders these varieties of little commercial importance, although they are worthy of consideration in the home garden.

In a test of hill culture versus the matted row system, the hill grown berries averaged 1½ days earlier for the first picking and 7 days earlier for the last picking. The quality was unaffected by the method of culture.

Strawberry culture, G. MARTELLI (*La Coltivazione delle Fragole. Catania, 1912, pp. 51, figs. 11*).—A popular treatise on the history, botany, culture, and uses of the strawberry.

The cherimoya in California, with notes on some other anonaceous fruits, F. W. POPEHOE (*Pomona Col. Jour. Econ. Bot., 2 (1912), No. 2, pp. 277-300, figs. 16*).—The cherimoya (*Annona cherimolia*) is here described with reference to its botany, origin, common names, climatic requirements, propagation, culture, diseases, insect pests, season, shipping qualities, nature and extent of seedling variation, and varieties, together with information relative to the present status of its culture in California. Other species of *Annona* fruited in California, as well as all of the anonaceous fruits introduced there, are also described.

Feljoa sellowiana, its history, culture, and varieties, F. W. POPEHOE (*Pomona Col. Jour. Econ. Bot., 2 (1912), No. 1, pp. 217-242, figs. 13*).—The *Feljoa*, a comparatively new fruiting shrub from South America which gives promise of thriving throughout the warm sections of the United States, is here discussed relative to its history, botany, introduction and trial in various parts of Europe and North America, methods of propagation, climatic requirements, culture, season, the fruit and its uses, keeping and shipping qualities, diseases and insect pests, and variation and varieties.

Wild fruits which ought to be cultivated, C. E. BESSEY (*Nebr. Hort., 2 (1912), No. 4, pp. 1, 5-8*).—The author discusses somewhat in detail a number of wild fruits of Nebraska which are considered worthy of cultivation.

The palms indigenous to Cuba, I. O. BECCARI (*Pomona Col. Jour. Econ. Bot., 2 (1912), No. 2, pp. 253-276, figs. 10*).—This is a contribution to the knowledge of the palm flora of Cuba. The present part contains a conspectus of the genera and conspectuses of the *Oreodoxa*, *Pseudophoenix*, and *Gaussia*.

¶Cacao manurial plats in Dominica], H. A. TEMPANY (*Imp. Dept. Agr. West Indies, Rpts. Bot. Sta. Dominica, 1910-11, pp. 22-32*).—This is a progress report on the fertilizer and mulching experiments being conducted with cacao at the Dominica Botanic Station, including the results of fertilizer experiments conducted in several country districts. The results as a whole confirm those previously noted (*E. S. R., 24, p. 545*).

Spices, H. N. RIPLEY (*London, 1912, pp. IX+449, figs. 15*).—A handbook of information relative to the history, cultural requirements, exploitation, and uses of the following spices and condiments: Vanilla, nutmegs and mace, cloves, pimento or allspice, cinnamon, cassia bark, massey bark, black peppers, long pepper, grains of paradise, cardamoms, capsicums or chilies, coriander, dill, cumin, ginger, turmeric, zedoary, galangal, and calamus root.

Everblooming roses, GEORGIA T. DEENNAN (*New York, 1912, pp. XII+250, pls. 16*).—A popular work treating of the culture, habits, characteristics, care, nativity, and parentage of roses, with authentic guides to the selection of everblooming varieties.

Preparation and use of the concentrated lime-sulphur spray, J. P. STEWART (*Pennsylvania Sta. Bul. 115, pp. 3-23, figs. 3*).—This bulletin, which replaces Bulletin 99 (*E. S. R., 23, p. 286*) of the same series, brings the results and recommendations relative to the preparation and use of concentrated lime-sulphur spray up to date.

On the occurrence of arsenate of lead in the wine, lees, and seeds obtained in vineyards treated with arsenate of lead, P. CARLES and L. BARTHE (*Bul. Soc. Chim. France*, 4. ser., 11 (1912), No. 8, pp. 413-417).—Analyses of wines taken from vines sprayed with an excess of arsenate of lead showed only slight traces of arsenic and of lead. No arsenic or lead were found in wines obtained from vines normally treated. Larger amounts of arsenic and of lead were found in the lees of grapes receiving arsenical sprays, however, and the authors conclude that where the wines contain an undue proportion of lees a certain amount of the arsenic and the lead will occur in the wine. The danger of poisoning from this cause, however, is not considered serious.

FORESTRY.

Second-growth hardwoods in Connecticut, F. H. FROTHINGHAM (*U. S. Dept. Agr., Forest Serv. Bul. 96*, pp. 70, pls. 6, figs. 3).—This comprises the results of a study conducted cooperatively by the Forest Service and the Connecticut State Station to determine the rate of growth of second-growth hardwoods in Connecticut, the value of the standing timber for different uses, and the method of management to secure the maximum yield of most valuable material in the shortest time.

Part 1 deals with the present forest conditions in Connecticut, including a description of the second-growth types. Part 2 discusses methods of selling timber, market values and uses of native forest products, logging costs, and value of standing timber for different uses. In part 3 the factors which influence the yield of even-aged hardwood stands are discussed. General yield tables, together with yield tables for cordwood, lumber, ties, and poles are given with directions for their use. Growth tables for average even-aged hardwood stands are also included. In part 4 the management of hardwood stands is discussed under the general headings of choice of species, factors influencing rotation, thinnings, final cutting and reproduction, protection, and financial returns. A number of volume tables, together with tables showing the yield of individual oak and oak-chestnut stands are appended.

The testing of pine seeds, HAAECK (*Ztschr. Forst u. Jagdw.*, 44 (1912), Nos. 4, pp. 193-222, figs. 7; 5, pp. 273-307, pl. 1).—In continuation of previous investigations (*E. S. R.*, 21, p. 441), extensive experiments were conducted in 1910 and 1911 to study the influence of individual germination factors, such as the time of the year when tests are made, moisture, heat, light, and chemical treatment of seed, as well as to determine the practical application of the ratio between the germinative energy of a seed sample and the number of seedlings produced therefrom in determining the market value of the sample. The experiments are described in detail, together with a discussion of their application and value as compared with methods generally used in testing pine seeds.

The author found that tests of pine, and spruce seeds as well, may be conducted at any time of the year, providing conditions favorable to germination, such as moisture, heat, and light can be provided for.

Although germination at low temperatures was found to begin later and to spread out over a longer period than at high temperatures, the relation between germination temperature and the germination duration is such that the product of the time period and the number of seedlings is practically the same whether the tests are conducted at high or low temperatures. Varying high temperatures have a stimulating effect on the germination of pine seed but not on spruce seed. This effect is somewhat similar to the effect of light exposure but not so powerful as the latter effect. A constant temperature of 25° C. is recommended for seed testing stations.

All parts of a spectrum acted favorably on the germination of pine seed, the long undulating rays being most beneficial and the short blue rays less beneficial. Spruce seed was acted on favorably only by the red and yellow light and may be directly injured by the blue light.

In making seed tests it is sufficient to germinate the seed under light conditions for a period of from 8 to 10 hours daily. The best degree of light is one in which reading can be easily done. There was no important difference between the influence of daylight and of artificial light. Daylight tests should preferably be conducted in rooms facing the north, where they will not be exposed to the direct sunlight.

Other conditions being equal the germination process of different seed samples may be traced in a curve, the latter course of which can be readily traced by accurately recording the course of the curve during the first few days after germination. For practical purposes a 12-day observation of tests conducted at 25° is considered sufficient.

Experimental rubber cultivation, J. B. HARRISON (*Rpt. Dept. Sci. and Agr. Brit. Guiana, 1910-11, pp. 8-13*).—A progress report on cultural and tapping experiments with indigenous and imported varieties of rubber yielding plants during the year 1910-11 is presented.

The rubber industry, edited by J. TORREY and A. S. MANDERS (*London [1912], pp. 470, figs. 51*).—This is the official report of the proceedings of the International Rubber Congress, London, 1911.

In addition to the matters relating to the organization and the functions of the congress the following papers were presented: Rubber in Uganda, by R. Fyfe (pp. 45-58); The Production of Rubber in Madagascar, by the colonial government of Madagascar (pp. 59-68); Lecture on the West Indies, by F. A. Stockdale (pp. 69-72); The West African Varieties of Latex and Ray Rubber, by M. C. Hugot (pp. 73-80); Rubber Plantations in French Cochinchina, by A. Cremazy (pp. 81-86); Rubber Trees and Wild Rubber Reserves of the Amazon, by J. Huber (pp. 87-98); The Rubber Industry in Peru, by E. Castejón (pp. 99-104); The Rubber Problem in French Western Africa, by A. Chevalier (pp. 105-119); Notes on the Planting and Production of Rubber in Ceylon, by K. Bamber (pp. 120-131); The Need of Organization in the Supply of Literature and Labor for Rubber and Other Planters, by H. H. Smith (pp. 135-141); Official Measures against Adulteration of Wild Rubber, by G. van den Kerkhove (pp. 142-148); The Maintenance of Health in Rubber Planting Districts, by W. C. Brown (pp. 149-159); The Para (Hevea) India Rubber Tree in the East, by H. A. Wickham (pp. 163-168); The Manuring of Rubber Trees, by E. Llerke (pp. 169-179); Some Diseases of *Hevea brasiliensis*, by J. Mitchell (pp. 180-189); Tapping Experiments on *H. brasiliensis*, by W. R. Tromp de Haas (pp. 190-196); African Rubber Vines: Their Cultivation and Working, by E. de Wildeman (pp. 197-209); Notes on the Cultivation of Para Rubber, by W. Fox (pp. 210-215); Some of the Constituents of *Parthenium argentatum* (Gray), The Shrub from which Comes the So-Called "Guayule Rubber," by P. Alexander (pp. 216-222); On the Physical Constitution of Caoutchouc-Bearing Latexes and the Relation of the So-Called "Coagulation" thereto, by H. C. T. Gardner (pp. 225-230); The Centrifugalization of Rubber Latex, by H. S. Smith (pp. 231-233); The Discovery of the Para Reagent, by W. Pahl (pp. 234-242); Viscosity of Hevea Latex at Various Dilutions, by Miss A. T. Borrowman (pp. 243-247); Some Remarks on the Preservation of Rubber and on the Preparation of Plantation Rubber, by W. Esch (pp. 248-259); The Viscosity of Rubber and Its Solutions, by P. Schildrowitz and A. H. Goldsbrough (pp. 260-264); Raw Rubber Testing, by C. Beadle and H. P. Stevens (pp. 265-284); India Rubber Research, by F. Frank (pp. 301-305); Theory of Vulcanization, by W. Hinrichsen (pp.

308-310); The Adaptation of Different Raw Rubbers for Manufacturing Purposes, by J. Jaques (pp. 311-317); The Technical Use of Plantation Rubber and the Conditions which, in the Production of Raw Rubber, are of Importance for its Technical Application, with Special Reference to Kiekxla (Funtumia) and Manihot Rubber, by F. Frank (pp. 317-326); The Extensibility of Vulcanized Rubber, by C. Chéneveau and F. Helm (pp. 327-335); The Oxidation of Sulphur by Nitric Acid, by H. E. Potts (pp. 336-343); Impact-Tensile Tests on Rubber and a Comparison with Tensile and Hysteresis Tests, by C. Beadle and H. P. Stevens (pp. 344-350); Mechanical Tests for Rubber, by K. Memmler (pp. 351-373); The World's Trade in Raw Rubber, by E. Hecht (pp. 377-380) and Factors Affecting the Valuation of Rubber Shares, by W. Tinnock (pp. 381-388).

Method and tables for the determination of the volume and value accretion in standing trees, E. ANDERSSON (*Skogsvårdsför. Tidskr.*, 1912, *Fackafd.*, No. 1, pp. 20-32, figs. 3).—The derivation and use of tables for the determination of volume and value accretion are here described.

State afforestation in New Zealand, W. C. KENSINGTON (*New Zeal. Off. Year-book*, 1911, pp. 815-824).—The author calls attention to the need of afforestation in New Zealand and describes the work which the government has been doing along this line in recent years.

The Deliblat sand barrens in southern Hungary, E. VON AJTAY (*Österr. Vrtjschr. Forstw.*, n. ser., 30 (1912), No. 1, pp. 43-66).—A historical and descriptive account of afforestation and sand dune reclamation in the above named region.

A review of the results of the Saxony state forest administration for the year 1910, VOGEL (*Tharand. Forstl. Jahrb.*, 63 (1912), No. 2, pp. 143-157).—A statistical and financial statement of the work and results of the forest administration for 1910.

Annual report on the forest administration in Ajmer-Merwara for 1910-11, HUKAM CHAND (*Ann. Rpt. Forest Admin. Ajmer-Merwara*, 1910-11, pp. 50).—The annual report on the constitution and management of the state forests of Ajmer-Merwara, including a financial statement for the year. Important data relative to areas, miscellaneous forest operations, expenditures, revenues, etc., are appended in tabular form.

Progress report of forest administration in the Punjab for the year 1910-11, C. P. FISHER (*Rpt. Forest Admin. Punjab*, 1910-11, pp. 3+20+LI).—A report similar to the above relative to the administration of state forests in Punjab.

Annual report of the forest administration for the year 1910-11 (*Pflanzer*, 8 (1912), *Beiheft* 1, pp. 42, pls. 6).—This comprises the annual report on the constitution, management, and exploitation of the forests in the various districts of German East Africa. The important data are appended in tabular form.

DISEASES OF PLANTS.

Notes on new or little-known plant diseases in North America for 1910, F. D. HEALD (*Phytopathology*, 2 (1912), No. 1, pp. 5-22).—A critical review is given of literature relating to various plant diseases reported in 1910.

Two dangerous imported plant diseases, P. SPAULDING and ETHEL C. FIELD (*U. S. Dept. Agr., Farmers' Bul.* 489, pp. 29, figs. 3).—Popular descriptions are given of the white pine blister rust due to *Peridermium strobi* and the potato black wart caused by *Chrysophlyctis endobiotica*. Both of these diseases have been introduced from Europe, the first in the importation of young pine seedlings and the second by the importation of potatoes. Thus far the potato dis-

ease has been reported in North America only from Newfoundland. Attention is called to the desirability of a quarantine as a means for preventing the further introduction and establishment of these diseases.

A review of literature relating to diseases of sugar beets and potatoes, A. STIRT (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 17-19, pp. 447-496).—This is a critical review of some of the more important literature relating to the diseases of sugar beets and potatoes and their control.

The control of the loose smuts of barley and wheat, K. STÖRMER ET AL. (*Deut. Landw. Presse*, 38 (1911), Nos. 88, pp. 1005, 1006; 89, p. 1017).—A study has been made of different methods of seed treatment for the prevention of the loose smuts of barley and wheat, especial attention being given the modified hot-water method. The relation of temperature and duration of the preliminary soaking of the seed grain to the water content of the seed was investigated, and also the maximum, minimum, and optimum temperatures for the germination of the smut spores and the development of the mycelium.

It was found that the spores germinate at temperatures between 5 and 35° C. and that the mycelium begins to grow at temperatures just below 6° and growth ceases at 34°. The maximum water content of the grain, about 32 per cent, was attained in preliminary treatments of 12 hours' soaking at 6° or 4 hours at 30°. The relation of this temperature to water content is discussed at length.

As practical methods for seed treatment, based on the observations of the authors, they recommend (1) soaking barley for 12 hours at 35° and wheat at 40°, and (2) a preliminary soaking for 4 hours at from 25 to 35° for barley and wheat, after which the seed is dipped for 10 minutes in water heated to 50 to 52° for barley and 52 to 53° for wheat. In place of hot water, hot air for $\frac{1}{2}$ hour may be substituted without drying the grain, 50 to 52° being maintained for barley and 52 to 53° for wheat. Where large amounts of seed are to be treated, forms of hot-air apparatus coupled with drying may be used, the temperature in the latter case falling to 40°.

Grain smuts and their control, O. BAOZ (*Monatsh. Landw.*, 4 (1911), No. 10, pp. 289-293, figs. 4; 5 (1912), No. 1, pp. 17, 18).—After giving a brief discussion of the various grain smuts, the author recommends three methods of treatment for infected seeds as follows:

Copper sulphate solution of 0.5 per cent strength is used to steep the grain, vigorously stirring the mass meanwhile. In the same way formaldehyde may be used, being made up to 1 or 2 per cent strength by adding to 100 liters of water 250 or 500 gm. of the 40 per cent commercial solution (formalin). The Jensen hot water treatment is preferred to the hot air treatment, and is said to destroy the mycelium which is claimed to arise from spore infection of the seed during its development in the parent flower. In the application of this treatment the grain, enclosed in very loose sacks, is steeped in water at 20° C. for 12 hours, then each sack is agitated for 1 minute in a vat at 46° and lastly for 10 minutes in a vessel at 50° to 52° in case of wheat or at from 48° to 50° in case of barley (higher temperatures will affect germination), and at once cooled in cold water and thoroughly dried. It is recommended that the seed be planted soon after treatment.

The leaf spot of oats, B. TACKE (*Mitt. Deut. Landw. Gesell.*, 26. (1911), No. 3, pp. 26-28; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 31 (1911), No. 11-15, p. 321).—The author regards the so-called dry spot of oats, as well as somewhat similar troubles with other cultivated plants, as the result of nutritive disturbances due to overliming. The remedy indicated is the employment of fertilizers relatively low in lime.

Flower infection with cotton boll rots, C. W. EDGERTON (*Phytopathology*, 2 (1912), No. 1, pp. 23-27, pl. 1; *abs. in* No. 2, p. 98).—The studies of Barre

(E. S. R., 22, p. 648) relating to flower infection by the fungus causing cotton anthracnose led the author to investigate the subject at some length. He claims that infection of cotton bolls following flower inoculation can take place in either of two ways. The system may grow saprophytically upon the dead flower parts and finally grow through and into the boll, or it may cause the disease by growing down through the pistil into the boll. The anthracnose probably follows both methods, while the cotton bacterium (*Bacterium malvacearum*) infects the bolls through the first method.

The author carried on a large number of inoculations in which he injected organisms suspended in water into the flowers, and determined the infection. More than half of the diseased bolls were attacked at the tip, while the percentage of infection along the lines of dehiscence was small. When the bolls are small they are readily infected with anthracnose, though, so far as the observations of the author go, no one part of the boll is more susceptible than another. It is evident that the bolls may be infected through the flowers, but the author claims that this is not the usual method of infection.

Sclerotinia panacis n. sp. the cause of a root rot of ginseng, W. H. RANKIN (*Phytopathology*, 2 (1912), No. 1, pp. 28-31, pl. 1, fig. 1).—While investigating the diseases of ginseng in 1909, the author became interested in the disease commonly known as black rot (E. S. R., 22, p. 246). Subsequent investigations showed a rather widespread infection, and specimens were collected and kept in a culture chamber at ordinary room temperature, but no growth followed.

In 1910 a further study was made and the perfect stage of the fungus discovered. This differed from the species of *Sclerotinia* already described. Primary infection of the roots seemed to occur at no regular place, as they were found to start either at the crowns or in smaller roots.

Control measures have not been definitely determined, but the eradication of affected roots and soil sterilization with formaldehyde or steam are recommended.

A technical description of the fungus, *S. panacis* n. sp., is given.

Infection experiments with potato fungi, H. W. WOLLENWEBER and O. SCHLUMBERGER (*Mitt. K. Biol. Anst. Land u. Forstw.*, 1911, No. 11, pp. 15-17; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 315).—The authors infected tubers with spores of *Verticillium albo-atrum*, *Fusarium solani*, *F. caeruleum*, *F. orthoceras*, *F. subulatum*, and *F. discolor* by means of the Pravaz spray.

It was found that the spores of *F. caeruleum* and *F. solani* germinated in part and caused in isolated cases a slight rotting which did not extend to the whole tuber in any case. The other infections gave negative results. No decisive results were obtained by infection of stems and roots with the spores of the fungi named.

The natural distribution of Fusaria on the potato plant, H. W. WOLLENWEBER (*Mitt. K. Biol. Anst. Land u. Forstw.*, 1911, No. 11, pp. 20-23; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 326).—The author states, as the result of his investigations, that *Fusarium subulatum* and *F. dimerum* are the most common forms, attacking all organs of the host plant. The former is said to be almost omnivorous. It is found late in August in the stems which remain green, as is true also of *Verticillium albo-atrum*. Those which occur most commonly on the tubers are *F. solani*, *F. martii*, *F. caeruleum*, and *F. discolor sulphureum*.

Leaf roll of potatoes, O. APPEL and O. SCHLUMBERGER (*Mitt. K. Biol. Anst. Land u. Forstw.*, 1911, No. 11, pp. 13-15; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, pp. 321, 322).—The authors investigated the statement that enlargement of the mother tuber is a characteristic of potato plants

affected with leaf roll. It was found that such enlargement took place also in case of potatoes not so affected, lasting for about the first 4 weeks after planting.

Successive crops from planting affected tubers were found to diminish both in number and size of tubers produced until in from 4 to 7 years the results became practically nil. A few escaped from this decline and showed a tendency toward normal products, which tendency is to be more fully tested. See also previous notes (E. S. R., 21, p. 243; 22, p. 347).

Bacterial rot of potato, O. APPEL (*Mitt. K. Biol. Anst. Land u. Forstw.*, 1911, No. 11, pp. 12, 13; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 319).—It is stated that a soft rot of potato tubers is caused by *Bacterium xanthochlorum*, also that this organism causes a blackleg disease of *Vicia faba* and a stem rot of *Lupinus manus*. The author was not able to breed from *B. fluorescens*, which at 35° C. takes on pathogenic characters, a race corresponding to *B. xanthochlorum*.

Investigations with potato scab, A. BERNHARD (*Deut. Landw. Presse*, 33 (1911), No. 27, p. 320; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 31 (1911), No. 11-15, pp. 399, 400).—Continuing previous investigations (E. S. R., 25, p. 245), the author compared results from the use of sulphur alone with those from its use in connection with lime. The all-sulphur treatment seemed the more effective.

The results obtained from planting seed potatoes affected with scab seem to forbid such use of infected tubers, while sound seed tubers in infected soil showed only sporadic infection.

Rice blight, J. L. HEWITT (*Arkansas Sta. Bul.* 110, pp. 447-459).—A form of rice blight characterized by the appearance of blighted heads at the time the grain is ripening is described.

Various theories have been proposed as to the cause of this trouble. The author has investigated a number of them and has arrived at the conclusion that it is due to some soil condition, probably an organic disturbance, and that whatever it is that causes the disease the plant suffers through injury to the root system.

An investigation of a number of plants from badly infected and slightly infected portions of the field and from a field which contained no blight showed that the roots were injured in proportion to the amount of blight. The blight appears to be associated with decaying plant debris in the soil, and the author proposes this as a working hypothesis to be further investigated.

For preventing the disease, the rotation of crops so as to have rice follow some crop that will leave the land free from decaying debris, plowing late in the fall, the burning of stubble, and such other means as are feasible to complete the normal decay or removal of all straw, weeds, and trash are suggested.

The beet nematode, L. FULMER (*Monatsh. Landw.*, 4 (1911), No. 9, pp. 268-275, figs. 8; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 314).—This parasite was studied chiefly in its relation to the sugar beet. Its life history is discussed, also direct and indirect methods of combating its ravages, which also extend to several other cultivated plants. The development period is said to depend largely upon temperature.

Recommendations are made as to economical means for control of the disease, mainly along the following lines: (1) Rotation of crops so that no two which are favorable to the pest shall be planted within 4 years, (2) careful adaptation of fertilizers to soils, (3) shallower plowing, (4) avoidance of carrying infection by feet or tools, (5) removal of harboring weeds, and (6) the Kühn device of trap plants.

Further notes on the sooty mold of tobacco, E. INGLESE (*Bol. Tec. Coll. Tabacchi [Scafati]*, 10 (1911), No. 5, pp. 255-267; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 1, pp. 308,

1929).—In continuation of the author's investigations on the sooty mold of tobacco (E. S. R., 25, p. 455), a study was made of the effect of temperature on the formation of honeydew on the plants. Strong healthy plants about one-third grown were subjected to low and high temperatures by watering with hot and cold water, by placing ice around the plants, by injecting steam under bell jars, etc.

Aside from the temporary disturbance to the nutrition and transpiration of the plants, no injurious effect was noted, and it is concluded that sudden inequalities of temperature have no direct relation to the secretion of honeydew.

Some means for the control of *Thielavia* on tobacco, AIELLI-DONNARUMMA *Bol. Tec. Colto. Tabacchi [Scafati]*, 10 (1911), No. 5, pp. 277-281; *abs. in internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intl. and Plant Diseases*, 3 (1912), No. 1, pp. 310, 311).—In experiments in the hybridization of tobacco it has been found that some crosses between the varieties locally known as Kentucky and Italia are quite resistant to attacks of *T. basicola*. One form, called type B, is not only of excellent character as to growth, productivity, and quality, but out of 66 plantations containing more than 320,000 plants, none was attacked by the fungus.

Diseases of cabbage and related crops and their control, L. L. HARTER (*U. S. Dept. Agr., Farmers' Bul.* 488, pp. 32, figs. 7).—Popular descriptions are given of a number of the more important diseases of cabbage and other cruciferous plants, with directions for their control. The diseases described are club foot, nematode root knot, black rot, wilt, blackleg, soft rot, malnutrition, downy mildew, white rust, spot disease of cauliflower, leaf blight, powdery mildew and lamping off.

Tomato leaf rust (*Bd. Agr. and Fisheries [London], Leaflet* 262, 1912, pp. 3, fig. 1).—A description is given of the leaf rust of tomatoes due to *Cladosporium fulvum*, which, it is said, is becoming a serious pest in parts of Europe. Spraying, if attempted, should be begun early so as to protect the plants, and when the plants are young half-strength Bordeaux mixture may be employed. When the plants are in flower and young fruit present, the use of a solution of potassium sulphid is recommended.

The enzymatic activity of some fruit fungi, D. BRUSCHI (*Atti. R. Accad. Lincei Rend. Cl. Sci. Fis., Mat. e Nat.*, 5. ser., 21 (1912), I, Nos. 3, pp. 225-230; 4, pp. 293-304).—After a brief account of observations made by others in his connection, the author reports his own studies with *Fusarium niveum*, *F. lycopersici*, and *Monilia cinerea*, in substance as follows:

The toxic activity of the 3 fungi studied upon the cells of such fruits as are attacked by them, as the plum, tomato, etc., is not proportional to the acidity of the fungus extract employed, and this toxicity is decreased by heating. None of these 3 fungi produces an enzyme capable of attacking cellulose, but *F. niveum* and *M. cinerea* secrete a pectinase which, by dissolving the middle part of the cell wall of fruits, produces rapid maceration. It is doubtful if this ability is shared by *F. lycopersici*. Each of these 3 fungi appears to develop an enzyme capable of breaking up nitrogen compounds into proteids and nonproteids.

Gummosis, F. A. WOLF (*Plant World*, 15 (1912), No. 3, pp. 60-66).—The author reviews the various theories that have been advanced to explain the phenomenon of gummosis, which is conspicuous in species of Prunus and Citrus. He claims that until the immediate cause of gummosis is demonstrated, it is reasonable to believe that enzymes play a very important rôle.

Apple tree anthracnose, H. S. JACKSON (*Oregon Sta. Circ.* 17, pp. 4).—The apple tree anthracnose due to *Gloeosporium malicorticis* is described. This is one of the most serious fungus diseases of the apple in Oregon. It causes

cankers on the trunk and branches, the infection usually taking place in the fall of the year after the early rains. In addition to the cankers on the tree the fungus is sometimes found upon the fruit.

For the control of the disease the author recommends treatment based on orchard experiments which proved successful in reducing the amount of disease. The treatment consists of spraying with Bordeaux mixture, using a 4:4:50 solution, in the fall before the beginning of the rains, to be followed as soon as the fruit is picked by an additional spraying of a 6:6:50 Bordeaux mixture. It is believed that under ordinary conditions this treatment would be sufficient for controlling the disease, but where the fungus is very prevalent, an additional spraying should be given the trees, beginning somewhat earlier in the season. Where practical the cankers should be cut out before fully formed during the winter or early spring.

The raspberry cane blight and how to control it, P. J. O'GARA (*Off. Path. and Ent. Rogue River Valley, Bul. 4, 1911, pp. 8*).—The author gives a description of the raspberry cane blight caused by *Coniothyrium fuckelii*. This fungus attacks all the cultivated species belonging to the genus *Rubus*, and has also been observed on the wild species, as well as on roses and apples. The disease shows marked virulence with the black cap varieties of raspberries, and the Cuthbert, which is a red raspberry, suffers to a considerable extent. The varieties Lucretia and Primus of the dewberry are also badly injured.

The parasitism of the fungus has been demonstrated by inoculation experiments. For its control the author recommends the cutting out and removal of all infected canes, which should be burned, and after the field has been thoroughly cleaned, spraying in the fall before the rains begin with a rather strong Bordeaux mixture. An additional spraying should be given in the spring, about 3 applications being made before the blossoms appear. If roses are growing nearby they should also be given attention.

Bremedy for court noué (*Rev. Sci. [Paris], 50 (1912), I, No. 14, p. 440*).—In a brief note it is stated that Bertrand has found that the application of either sodium chlorid, or sulphate or phosphate of ammonia, to grapevines at the rate of 150 gm. per liter, following the method adopted for the treatment of chlorosis with iron sulphate, has given good results in combating the court noué, which is characterized by the extreme shortening of the internodes of grapevines. The use of Thomas slag as a fertilizer, applied at the rate of 250 gm. per plant, has also given encouraging results.

Combating leaf spot of grape (*Pseudopeziza tracheiphila*), A. BERNSTEINER (*Wiener Landw. Ztg., 61 (1911), No. 5, p. 43; abs. in Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 11-15, pp. 402, 403*).—Experiments were instituted by the author in order to test the hypothesis that this fungus lives through the winter in the veins of the fallen leaves, forms spores on these leaves during the winter, and infects the young leaves by means of these in the spring. Removal of the dead leaves seemed to make no difference in the spring infection. The author suggests that the fungus may winter in the vessels of the shoots. The use of sprays (1 per cent Bordeaux mixture, 1 to 2 per cent Cucusa, and 1 to 2 per cent Tenax) seemed to give equally beneficial results whether applied to the upper or the lower surface of the leaves.

The mildew fungi and protection therefrom, O. BBOZ (*Monatsh. Landw., 4 (1911), No. 3, pp. 71-78, figs. 6; abs. in Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 11-15, p. 403*).—This is a somewhat popularized discussion of the so-called true mildew fungi (*Erysiphe*) in connection with suggestions for their control, the main reliance being placed on sulphur applied to the green foliage. Bordeaux mixture is recommended as a wash for trees and vines in 2 per cent

strength before leaf fall and 5 per cent in February or March before the young leaves appear.

Experiments on the prevention of olive bacteriosis, G. BELLINI (*Coltivatore*, 77 (1911), No. 32, pp. 431-433; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 1, p. 311).—The author describes the results of experiments carried on in Tuscany on the prevention of the spread of the olive bacteriosis, due to *Bacillus oleæ*.

In April, 1910, a hailstorm severely injured a large olive plantation. The small branches which had been injured by hail were cut from the trees, after which the limbs and trunk of the tree received a strong application of iron sulphate, consisting of iron sulphate 15 kg., lime 15 kg., and water 100 liters. At the same time the trees were sprayed with a dilute Bordeaux mixture composed of 0.8 kg. of copper sulphate, 0.8 kg. lime, and 100 liters of water. The bacterial tumors were cut out wherever observed and the cut surfaces treated with the mixture composed of iron sulphate and lime.

At the close of 1911 no evidence of bacteriosis was to be seen on any of the trees. The growth during the summer had been exceptionally vigorous, and the prospect for a large yield the next year was considered quite promising.

Glauosporiose of the Japanese persimmon, S. ITO (*Bot. Mag. [Tokyo]*, 25 (1911), No. 296, pp. 197-201, figs. 2; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 1, p. 321).—In 1910 the author collected and examined a number of specimens of diseased fruit of the Japanese persimmon (*Diospyros kaki*). The present study was undertaken to determine the cause of this disease, which sometimes occasions considerable loss. Badly affected trees are known not to produce fruit for 3 years.

The symptoms of the disease may be recognized by the appearance in the middle or latter part of July of small spots on the unripe fruit. These are black, of varying sizes, from that of a pin head to from 1 to 2.5 cm. in diameter, circular or elliptical in outline, and frequently bordered by a yellowish brown ring. By the coalescence of a number of these spots a considerable area of the fruit may become involved. The affected fruits usually fall to the ground before ripening, and decomposition is hastened by other fungi. The fungus is also capable of attacking fruits in storage.

Inoculation experiments showed that the fungus can be readily transferred to ripe apples when the spores are inoculated on the wounded surface, but the reciprocal infection of the spores of *Glomerella rufomaculans* on green persimmons always gave negative results.

The fungus causing this disease is believed to have been hitherto undescribed, and the name *Glauosporium kaki* n. sp. is given it.

The cause of mottled leaf, R. R. SNOWDEN (*Fla. Grower*, 6 (1912), No. 2, pp. 3, 4).—The author believes that he has traced several cases of malnutrition and incipient chlorosis or mottled leaf in orange and lemon trees to an excessive proportion of magnesia to lime in the soil. Ash analyses of leaves from healthy and sick lemon trees showed that in the leaves from the sick plants the percentage of potash was more than doubled and phosphoric acid increased by 11½ times, while lime was reduced about 50 per cent.

An examination of the soil about thrifty and diseased plants indicated that the magnesia-lime ratio for oranges should not fall below 1 part of magnesia to 2 of lime. For lemons the ratio of 1:0.84 was sufficient to maintain good color in the foliage. Below that figure the leaves became mottled or decidedly yellow.

The bud rot of the coconut in Ceylon, N. PATOILLARD (*Jour. Agr. Trop.*, 11 (1911), No. 124, pp. 315, 316; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 1, pp. 319, 320).—The author

quotes from a letter calling attention to the extreme sensitiveness of the coconut palm in Ceylon to injury to its leaves. It is said that the slightest prick or scratch to the tender part of the plant may start the disease. At first a brownish mark appears around the wound, and this gradually spreads until it reaches the center of the bud, where all the young leaves are destroyed.

There seems to be a connection between the appearance of the monsoon and the bud rot. At this time the rains and storms accompanied by the wind not only cause a rapid increase in the sap, but also result in much injury to the leaves, often breaking them off at the base. It is thought that these accidental injuries form one of the principal means of entrance of the organisms which cause the disease.

Attention is directed to the apparent resistance to injury of the coconut palm of the West Indies, where the leaves are often cut without evidence of the occurrence of the disease.

A new disease of lily of the valley, J. POLITIS (*Riv. Patol. Veg.*, 5 (1911), No. 10, pp. 145-147; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 2, p. 566).—The author describes a disease of *Convallaria majalis* in the botanic gardens of Pavia, the plants being attacked by *Botrytis vulgaris*. The fungus caused much injury to the vegetative parts of the plant and reduced the number of flowers to a considerable extent. Inoculation experiments demonstrated the parasitism of the fungus, as has been shown by other investigators.

Loranthus sphaerocarpus parasitic on *Dracena*, F. ARENS (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 20-25, pp. 564-587, pl. 1, figs. 6).—This is a detailed study of host and parasite in their anatomical and physiological relations.

The mycoplasma theory, J. ERIKSSON (*Biol. Centbl.*, 30 (1910), No. 1, pp. 618-623).—This is a brief account of previous studies on the subject by the author and some others (*E. S. R.*, 26, p. 846).

Notes on some western Uredineæ which attack forest trees, G. G. HEDCOCK (*Mycologia*, 4 (1912), No. 8, pp. 141-147; *abs. in Phytopathology*, 2 (1912), No. 1, p. 47).—An account is given of a number of species of *Peridermium* which attack conifers, especially in the Western United States. Among them are *P. filamentosum*, *P. pseudo-balsameum*, *P. harknessii*, and *P. montanum*. In addition descriptions are given of *Uredo (Melampsora) bigelowii*, the acedial form of which occurs on larches, the other stages being very prevalent on willows in the West and Southwest. The presence of *U. (M.) medusa*, a fungus common on poplar, is also noted.

The chestnut bark disease, N. J. GIDDINGS (*West Virginia Sta. Bul.* 137, pp. 209-225, figs. 12).—The blight or bark disease of chestnut due to *Diaporthe parasitica* is described. The history of the disease, description of its attack on chestnut trees, and its distribution throughout the United States are indicated, together with such measures as have been adopted by the U. S. Department of Agriculture and the Pennsylvania Chestnut Tree Blight Commission for its control. The author states that the disease has been reported from 3 rather widely separated localities in West Virginia, and recommendations are made to prevent its establishment and spread.

The progress of the fight against the chestnut blight (*Forest Leaves*, 13 (1911), No. 6, pp. 88, 89, figs. 6).—An account is given of the work of the Pennsylvania Chestnut Tree Blight Commission during 1911 in locating the spread of the chestnut blight in the State. The commission is carrying on laboratory work, determining the life history of the fungus. It is stated that the only practical method of destroying the spores is felling the trees and burning the bark and brush. As part of the State is badly infected, the commission is recommending the cutting and utilization of the timber as rapidly as possible.

The wintering and combating of the oak mildew, F. W. NEGER (*Tharand. Forstl. Jahrb.*, 62 (1911), No. 1, pp. 1-9, figs. 3).—Investigations are reported which indicate that the conidia of the oak mildew do not withstand the winter, but that the fungus is carried over by means of mycelium in the buds. For the control of the mildew in nurseries and elsewhere 1 or 2 sprayings with lime-sulphur are recommended, the number of applications to be determined by the virulence of the attack.

Preliminary notes on three rots of Juniper, G. G. HENDECOCK and W. H. LONG (*Mycologia*, 4 (1912), No. 3, pp. 109-114, pls. 2; *abs. in Phytopathology*, 2 (1912), No. 1, p. 48).—The authors give descriptions of the gross and microchemical characters of 3 heart rots of junipers, also the distribution and damage done by each, and technical descriptions of the sporophores. The rots discussed are the white rot of *Juniperus virginiana*, due to *Fomes juniperinus*; yellow rot of *J. monosperma*, *J. utahensis*, and *J. sabinoides*, caused by *F. earlei*; and the stringy brown rot of *J. sabinoides*, *J. monosperma*, and *J. utahensis*, caused by *F. texanus*.

The nature of witches' brooms on *Pinus sylvestris*, F. ZACH and K. VON UNKUF (*Naturw. Ztschr. Forst u. Landw.*, 10 (1912), No. 1, pp. 61-64, fig. 1).—A discussion is given on the nature and causes of witches' brooms occurring on the above and other species of pine.

The blister rust of white pine, A. D. SELBY (*Ohio Nat.*, 11 (1911), No. 4, p. 235, 236; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 333).—This disease, known to have been found recently in two or three places in the United States, is thought by the author to have come from Germany with seedlings bought there. The blister rust has long been notable in that country on account of its preference for American white pine. The fungus (*Peridermium strobi*) is stated to be one stage of the rust of currants and gooseberries (*Gronartium ribicola*).

A disease of eucalyptus, R. AVERNA-SACCÁ (*Bol. Agr. [São Paulo]*, 12, ser., 911, No. 7, pp. 474-482, fig. 1).—The author describes a disease of eucalyptus due to some species of Erysiphaceæ, and gives briefly the results of experiments for its control. The disease is most prevalent upon seedlings in the nursery, and spraying with potassium sulphate solution or the use of sulphur is recommended. In case of the presence of another disease, which is thought to be due to Peronospora, the addition of 3 per cent powdered copper sulphate to the sulphur is advised.

A new paint-destroying fungus, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform.*, 1911, No. 8, pp. 325, 326, pl. 1).—The author describes a fungus that flourishes in great profusion on fresh paint in hothouses, its development being favored by a high temperature and constant humidity. It has also been observed occurring on paint elsewhere.

About a month or two after a hothouse has been painted, numerous small pale rose-colored specks appear. These increase in size and change to a purple or sometimes dark red color. Where white paint has been used the coloring is very conspicuous. When the fungus appears in abundance the paint is ruined, in one instance a loss of more than \$1,000 in a number of greenhouses being reported.

The presence of 2 per cent carbolic acid in paint was found to arrest the development of the fungus, and hydrogen peroxid would bleach or considerably reduce the red color without injuring the paint.

The fungus, which is believed to be undescribed, is named *Phoma pigmentaria* n. sp., and a technical description is given.

Experiments with lime sulphur against some fungus diseases, B. SAVASTIANO (*R. Staz. Sper. Agrum. e Frutticol. Acreate*, *Bol.* 5, 1912, pp. 6).—Ex-

periments are reported in which lime-sulphur solutions were used to control the sooty mold on olives and oranges and the mildews of grapes, peaches, roses, oaks, etc.

The results show that lime-sulphur is efficient in controlling powdery mildew, exceeding in that respect sulphur as ordinarily applied. For the sooty mold the results were less definite, although the solution had value as an insecticide against the scale insects. For the rose rust it was inefficient.

Notes on the preparation of copper fungicides, G. CHAPPAZ (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 12, pp. 353-360, figs. 3).—Directions are given for the preparation of various fungicides, and particular attention is paid to what are believed to be some of the essential facts relative to securing the most beneficial mixtures. The fungicides described are Bordeaux mixture, Burgundy mixture, Bordeaux mixture modified by the addition of neutral copper acetate, and fungicides containing soap, resin, oil, etc.

The influence of tobacco smoke on plants, H. MOLISCH (*Anzeiger K. Akad. Wiss. Wien, Math. Naturw. Kl.*, 1911, No. 2, pp. 20-22; *abs. in Centbl. Bot. [etc.]*, 2. Abt., 31 (1911), No. 11-15, pp. 380, 381).—This is substantially a summary of reports already noted elsewhere (*E. S. R.*, 26, p. 230).

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Further notes on the fruit-eating habits of the sage thrasher in the Yakima Valley, Washington, C. H. KENNEY (*Auk*, 29 (1912), No. 2, pp. 224-226).—In these further notes (*E. S. R.*, 25, p. 150), the author states that the sage thrasher (*Oreoscoptes montanus*) did not appear in 1911 in numbers until the middle of August, thus was too late to attack blackberries and raspberries.

It was found that the omission of summer pruning to remove the extra foliage effectually protected nearly all of the bunches of Campbell Early grapes, the earliest variety to ripen, and concentrated the damage on the few that were exposed. It failed, however, to save the Tokays and other *Vitis vinifera* varieties, which began ripening 3 weeks after Campbell Early. In order to save the later varieties shooting was resorted to. "The small number killed and the speedy and complete disappearance of the species seemed to indicate that they are very local in their individual ranges, and that these were living altogether in the vineyard during their depredations."

The results of examinations made of 12 stomachs are reported.

"The omission of summer pruning is not a satisfactory method of saving the Campbell Early grapes as the later ripening involves a loss of about 30 per cent in value." The sage thrasher must be killed, and it is thought to be justifiable to shoot early enough to save the Campbell Early.

The English sparrow as a pest, N. DEARBORN (*U. S. Dept. Agr., Farmers' Bul.* 493, pp. 24, figs. 17).—This bulletin, designed to supersede Farmers' Bulletin 383 (*E. S. R.*, 22, p. 549), describes means for aiding native birds against the English sparrow, the prevention of increase, and the best methods of effecting a reduction of their number. Additional directions for trapping and illustrated plans for the construction of traps are included.

Starling (*Sturnus vulgaris*) in Chester County, Pa., T. H. JACKSON (*Auk* 29 (1912), No. 2, pp. 243, 244).—A flock of 30 or more individuals is reported to have been observed in December near West Chester.

State of Washington laws relating to fish, oysters, and game, 1911 (*Olympia, Wash.: State Fish and Game Dept.*, 1911, pp. 116).—The laws relating to fish, oysters, and game are compiled and indexed in this handy form.

Methods in insect photography, W. C. O'KANE (*Jour. Econ. Ent.*, 5 (1912), No. 1, pp. 54-59, pl. 1).—This paper considers cameras and lenses, methods of lighting, posing the object, plates and developer, preparation for printing, and prints for half-tones.

Some recent new importations, C. L. MARLATT (*Jour. Econ. Ent.*, 5 (1912), No. 1, pp. 73-77).—Among the pests reported to have recently been introduced into the District of Columbia are the spruce aphid (*Lachnus juniperi*) on young spruce trees from Holland; a peach seed weevil (*Anthonomus druparium*), which is already a very serious pest in Europe from Siberia; a cecidomyiid, related to the Hessian fly, on lotus introduced as a fodder plant; the mango seed weevil (*Cryptorhynchus mangiferæ*); etc. The recently established pests mentioned include the European red tail (*Dasychira pudibunda*) in New Jersey; the European smaller elm bark beetle (*Scolytus multistriatus*) in Massachusetts; the apple seed chalcids (*Syntomaspis druparum*) in New York; *Pulvinaria peidii*, *Aleyrodes howardii*; and the oriental scale pest (*Conchaspis angræci*), in Florida, etc.

It is stated that the investigations conducted by the Bureau of Entomology in Pennsylvania last year have demonstrated that the apple seed chalcids has spread in destructive numbers into orchards in that State. In some orchards at least one-third of the crop was destroyed by it.

The insect enemies of trees and herbaceous plants in Uruguay, A. BOUYAT (*Rev. Assoc. Rural Uruguay*, 40 (1911), No. 9, pp. 707-718, figs. 5; *abs. in Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 11-12, p. 2612).—The more important insects are here considered, including their life history, damage caused, methods of treatment, enemies, etc.

Some apple insects of Connecticut, G. H. LAMSON (*Connecticut Storrs Sta. Bul.* 71, pp. 41-83, figs. 33).—A general account of insects and methods of control is followed by a brief popular account of the more common insect enemies of the apple with directions for combating them.

What is the matter with the elms in Illinois? S. A. FORBES (*Illinois Sta. Bul.* 154, pp. 3-22, figs. 10).—This bulletin calls attention to a fatal affection of the American white elm, "now prevailing over a large part of southern Illinois, similar to and apparently identical with one which destroyed many elms in the central part of the State some 30 years ago. The character, extent, and cause of this destruction are such as to make it plain either that the elm must receive much more intelligent and assiduous care and treatment than it has heretofore had in this State, or that it must yield its place to some tree more hardy under conditions which it has itself failed to support.

"The elm disease (if such it may be called) now prevalent is first noticed from early summer to autumn—the leaves, first on the terminal twigs and later on the larger branches, ceasing their growth, turning brown, and finally falling. This loss is presently followed by the death of the branches themselves, as is shown the following spring when the rest of the tree leaves out. Usually the higher branches are first affected, but the whole top soon seems to blight, and in a year or two the tree is dead. Sometimes this process is greatly shortened, and scores of trees may perish within a single year after the first effects are noticed; and sometimes, on the other hand, it is greatly lengthened, extending through 5 or 6 years, and, in mild cases, even ending in recovery.

"Although there may be no definite sign of insect injury anywhere, it is most commonly the case that a thorough search of the trunk and larger branches will show patches of dead bark under which there are 2 or more kinds of burrowing insect larvæ, or borers. The roots of these trees are often affected somewhat as the branches are; that is, the smaller, terminal, so-called feeding roots

die and dry up progressively, the process extending to the larger roots and the base of the trunk." It is stated that the trees are not affected when growing under natural woodland conditions.

The author concludes that the injury is caused in part by drought and natural conditions of the tree, resulting in starvation, and in part by borers in the trunk, attracted by the unthrifty state. The former is perhaps the primary trouble in most cases. He considers free watering, fertilizing, and mulching of the soil to be necessary, at least in severe drought. Care should be taken in trimming trees and painting cut surfaces to prevent infestation; the use of various mixtures as repellents to borers is also suggested.

Brief descriptions are given, together with illustrations and the life histories, of the elm borer (*Saperda tridactata*) and the reddish elm snout beetle (*Megadalis armicollis*), the insects chiefly concerned.

The cotton stainer (*Dysdercus suturellus*), W. D. HUNTER (U. S. Dept. Agr., Bur. Ent. Circ. 159, pp. 5, figs. 2).—*D. suturellus*, the only representative of the genus which occurs in the United States, is not of very great importance on account of its local restriction, but in Florida it is undoubtedly the most important cotton insect at the present time. Although it has a number of food plants, the only ones of special importance aside from cotton are the orange and the eggplant. Among the wild plants upon which this insect feeds are *Hibiscus* sp., as well as several others including guava, Spanish cocklebur (*Urena lobata*), and nightshade (*Solanum nigrum*).

The feasible means of control of this insect, in the order of their importance, are as follows: "(1) The prevention of the growth of the weeds upon which the cotton stainer breeds in great numbers; (2) the destruction, by means of kerosene and water, of the colonies of young bugs as soon as they make their appearance during the growing season; and (3) the attracting of the insects to small piles of cotton seed and their destruction when congregated in large numbers by means of hot water or kerosene."

Observations on the life history of *Enchenopa binotata*, I. MATATSCHE (Journ. N. Y. Ent. Soc., 20 (1912), No. 1, pp. 58-67, pls. 2).—This is an account of the eggs, larvæ, and nymphal forms of the membracid *E. binotata*.

Papers on Aphididæ.—Studies on a new species of Toxoptera, with an analytical key to the genus and notes on rearing methods, W. J. PHILLIPS and J. J. DAVIS (U. S. Dept. Agr., Bur. Ent. Bul. 25, pt. 1, tech. ser., pp. 16, pl. 1, figs. 9).—*Toxoptera mühlenbergia*, here described as new, first came under the authors' attention on July 24, 1908, at which time it was collected at New Paris, Ohio, on a species of *Muhlenbergia*. Later in the month it was found at Richmond, Ind. The species is closely related to the so-called green bug, having at first been mistaken for *T. graminum*.

Technical descriptions of its stages are presented. It has been found throughout northwestern and west-central Ohio and through east-central and northern Indiana, and probably occurs in any location in which *Muhlenbergia* flourishes. "Individuals of this species concentrate on the tender shoots and are rarely found on the tough leaves unless the plants are badly infested. They congregate in the curled central growing shoot. As this leaf expands and unfolds, they go to the younger curled leaf just below this. When in great numbers, they cause these tender shoots to wilt and turn yellow. Up to the present time *Muhlenbergia* sp. appears to be the normal host, though this aphid often goes to blue grass (*Poa pratensis*) when first hatched, since the young sometimes appear before *Muhlenbergia* has started growth. Colonies have been established on wheat, though they do not appear to thrive very well on it."

Approximately 10½ generations per year are indicated by the investigations here reported. "The period between birth and reproduction varies greatly,

being longest in the spring, when it varies from 15 to 22 days. In summer the shortest period was 6 days, varying from 6 to 13 days. In the fall it varies from 9 to 13 days. The average period throughout the season for the 13 individuals of the series of first born is 13.1 days.

The length of life, like the period between birth and reproduction, varies greatly. During the spring, when lower temperatures prevail, the viviparous forms will live from 30 to 63 days, while in the summer they live from 16 to 29 days, and in the fall over 30 days. The average length of life throughout the season for the 13 viviparous individuals of the series of first born is 28.9 days.

The sexes make their appearance about the first week in October. . . . A viviparous female may produce oviparous and viviparous females and males or she may produce only the sexes. Males and females reach maturity in from 15 to 23 days. The female will not oviposit without having first been fertilized and will live, under these conditions, for about a month, her abdomen becoming greatly distended with eggs. . . . When ready to oviposit, the females crawl down into the leaf sheath, which is usually separated from the plant stem for a part of its length and is somewhat curled, and deposit their eggs in this curled portion. The senior author has counted as many as 200 eggs in such a position."

A description of rearing methods followed is appended.

The life history of the alder blight aphid, *T. PERGANDE* (*U. S. Dept. Agr., Bur. Ent. Bul. 24, tech. ser., pp. 28, figs. 12*).—The author's long-continued observations of *Pemphigus acerifolii* Riley, inhabiting the soft or silver maple (*Acer dasycarpum*), and of *P. tessellata* Fitch, inhabiting the alders, have resulted in furnishing conclusive proof that these are "merely forms or series of one and the same species, which should now be known as *Prociophilus tessellata* (Fitch)."

P. acerifolii issues during the early or middle part of April, or as soon as the young leaves appear, from winter eggs deposited the previous fall in cracks or under loose bark on the trunks of maples, on which return migrants from alders had delivered themselves of the true sexes. These young stem-mothers, after hatching from winter eggs, travel upward onto the branches and settle on the midrib of the underside of the young leaflets. Usually there is but 1, though frequently there may be 2, 3, or more on the same leaf, in consequence of which, as well as from the increasing irritation, the leaves thus infested exhibit a more or less marked tendency to fold or almost to 'double up' from the midrib downward.

"Under or within this protection or covering there may be observed numbers of larvæ and pupæ of different stages, up to 100 or more, in company with their mother, all of which, from early in June to the end of July, or until the supply of migrants has been exhausted, develop into winged migrants, without, however, leaving any larvæ behind to continue the series on the maple. These migrants fly then to the alders, which frequently are rather distant from the maples, and settle at once on the underside of the leaves of these shrubs, where they are soon engaged in depositing their larvæ, which surround them in a circle of about 20 to 100. These larvæ, after feeding for about an hour or so, move to the twigs, branches, or stems of the shrubs to start a new cycle of life for the species. Here a number of generations is developed, after which, from about the middle of September to the middle of October, numerous return migrants are developed, which fly back to the trunks of the maples to continue the cycle of life prescribed by nature."

The original host plant of this species is, therefore, the silver maple and not the alder, which is a secondary food plant. The most active among the carnivorous enemies are the larvæ of the lycænid butterfly *Penisea tarquinus*, the larvæ of the lace wing fly *Chrysopa sichelii*, the larvæ and imagoes of 2 lady

beetles, *Hippodamia convergens* and *Adalia bipunctata*, the larvæ and imagoes of an hemipteron (*Nabis*) *Pagasa fusca*, and the larvæ of various syrphid flies, which generally prove very destructive to these aphids and frequently exterminate whole colonies. As yet no internal parasites of this species are known. The ants which have been observed to construct tunnels or covers over these aphids are *Tapinoma sessile* and *Cremastogaster lineolata*; among those which simply gather honeydew are *Camponotus pennsylvanicus*, *Lasius alienus*, and *Monomorium minimum*.

Technical descriptions are given of the principal stages.

Flour mill fumigation, W. H. GOODWIN (*Ohio Sta. Bul.* 234, pp. 171-184, fig. 1).—This bulletin deals with the control of the Mediterranean flour moth, which appeared in Ohio in 1895 and has since spread through the medium of secondhand machinery, and more often secondhand sacks, to many of the flour mills of the State.

It is stated that by the constant watching of spouts, machines, conveyors, and bolters, together with a thorough cleaning of the whole mill once or twice a year, the pests may be almost kept in control. Detailed directions are given for the fumigation of mills with hydrocyanic acid gas, together with an account of the fumigation of 3 mills by the author.

The generation of heat by steam radiators in a mill in which maximum temperatures were reached, 141° F. on the first floor, 138° on the second floor, and 142° on the third floor and deck, indicate that heat can be used successfully for protecting flour mills and stored products against insects. All stages of the following named mill pests are stated to have been killed, even by the temperature attained on the lower floor: Rice weevil, granary weevil, saw-toothed grain beetle (*Silvanus surinamensis*), yellow mealworm, dark mealworm (*Tenebrio obscurus*), cadelle, confused flour beetle (*Tribolium confusum*), *Platyedra* sp., and Mediterranean flour moth.

The advantages favoring the use of high temperature are summarized as follows: "It is not dangerous to human life as are all of the other fumigants which are even fairly effective. There is no possibility of injuring floors, belts, or machines, and practically no danger from fire. The cost of a treatment, after the heating system is installed, is less than one-fiftieth of that of hydrocyanic acid gas fumigation. No time is lost in getting ready to use heat. The mill does not need to be shut down a week beforehand, and as most of the Ohio flour mills use steam power, the cost of a heating system would not be prohibitive. High temperature, as compared with other methods of treatment, by saving time and extra expense, will pay for the average heating system required in a flour mill in less than 5 years."

Larvæ of a saturniid moth used as food by California Indians, J. M. ALDRICH (*Jour. N. Y. Ent. Soc.*, 20 (1912), No. 1, pp. 28-31, pl. 1).—Saturniid caterpillars, apparently of the genus *Hemileuca*, are said to be collected by the Indians of the Mono Lake region from the leaves of the yellow pine (*Pinus ponderosa*). A smudge made beneath the tree causes them to drop and they are then killed and dried. The collection of this caterpillar for food appears to be an industry of considerable importance in the territory along the Nevada-California line.

Some observations on the relations of ants and lycænid caterpillars, and a description of the relational organs of the latter, E. J. NEWCOMER (*Jour. N. Y. Ent. Soc.*, 20 (1912), No. 1, pp. 31-36, pls. 2).—The author, who has made observations on the behavior of ants toward the larvæ of *Lycæna fulla* and *L. pseudargiolus piusius*, finds the larvæ of the latter species very generally attended in the third and fourth instars by the ants *Tapinoma sessile* and *Prenolepis imparis*, and occasionally by *Cremastogaster* and *Camponotus* (?).

This attention is due to the excretion by the larva, from a slit on the tenth body segment, of a liquid agreeable to the ants.

Third report of director of fruit fly control, W. M. GIFFARD (*Hawaii. Forester and Agr.*, 9 (1912), No. 2, pp. 46-48).—It is stated that since the last report (*E. S. R.*, 20, p. 758) the entomological department has succeeded in breeding the Mediterranean fruit fly from the fruit of carambola and brown persimmon. "In the latter case a single fruit was handed us, it having been the only one maturing on a newly introduced species." The author states that this fly has been bred from Chinese oranges, received from the Kohala district in the island of Hawaii.

On the rearing of a *Dermatobia hominis*, A. BUSCK (*Proc. Ent. Soc. Wash.*, 14 (1912), No. 1, pp. 9-13).—An account of the actual breeding of this oestrid parasite from man.

The infestation took place at Cahima, Panama, on May 29; only 1 cast skin was observed during the larval period; this was shed and pushed out nearly entire through the aperture in the skin on July 19; on September 9 the larva had attained full growth and left the arm, posterior end first. On being placed in a jar with wet sand it immediately burrowed down 2 in. to the bottom of the jar and pupated. The fly issued on October 23. The author states that a much greater period of sleep was necessary during infestation.

The horse botflies in Argentina, F. LAHILLE (*Bol. Mm. Agr. [Buenos Aires]*, 13 (1911), No. 12, pp. 336-356, pl. 1, figs. 8; *Rev. Asoc. Rural Uruguay*, 41 (1912), No. 2, pp. 136-145).—An account of the life history, habits, and occurrence of *Gastrophilus nasalis*, the effect of its presence upon the host, prophylactic measures, etc., with notes on several other species.

The genera *Hypera* and *Phytonomus* (Coleoptera, Family Curculionidae) in America, north of Mexico, E. G. TITUS (*Ann. Ent. Soc. Amer.*, 4 (1911), No. 4, pp. 333-473, pls. 10, figs. 12).—One species of *Hypera* (*H. punctata*) and 12 of *Phytonomus*, namely, *P. eximius*, *P. quadricollis*, *P. comptus*, *P. diversipunctatus*, *P. seriatus*, *P. trivittatus*, *P. maritimus*, *P. castor*, *P. pubicollis*, *P. meles*, *P. nigrirostris*, and *P. posticus* are recognized. Under each species the author gives a complete synonymic bibliography, original description, new descriptions of the stages so far as known, distribution, food plants, and life history. Maps illustrating the distribution are included.

A revision of the genus *Lasconotus*, E. J. KRAUS (*Proc. Ent. Soc. Wash.*, 14 (1912), No. 1, pp. 25-44).—The author recognizes 24 species as belonging to this genus of the coleopterous family Colydiidae, 9 of which are described as new to science.

"Very little is known concerning the exact habits of the species. They are usually found associated with various scolytids inhabiting coniferous trees. Principal among these are *Pityophthorus* (*Tomicus*), and at least 2 species are found with *Phloeosinus*. Whether they are commensals or predaceous is not well known. The mouthparts, so far as I have examined, would indicate a predaceous habit; but even if so, whether they prey upon the scolytids themselves or the numerous other insects found in their galleries is still an open question. The larvæ is also so far unknown."

The sugar cane beetle in Mauritius (*Agr. News [Barbados]*, 11 (1912), No. 258, p. 90).—It is stated that the beetle, which has recently become a serious enemy of sugar cane in Mauritius,* has been identified as *Phytalus smithi*. The fact that this species occurs in the Barbados, but is not of economic importance, is thought to be due to some very effective natural enemy.

Papers on cereal and forage insects.—The false wireworms of the Pacific Northwest, J. A. HYSLOP (*U. S. Dept. Agr., Bur. Ent. Bul.* 95, pt. 5, pp. 73-87,

* *Bul. Agr. [Mauritius]*, 2 (1911), No. 19, pp. 475, 476.

figs. 6).—Up to within the past 5 years, except for a few scattering notices, the species of *Eleodes*, the larvæ of which are known as false wireworms, have been considered of only incidental if of any economic importance. Superficially the larvæ resemble the elaterid, or true wireworms, and on account of their resemblance and the similarity of their depredations in grain fields the two are often confused. On close examination, however, *Eleodes* larvæ are readily recognized by their structure.

Reports of their injury have been received or published from Nebraska, Kansas, and Washington. The results of 3 seasons' work in the Pacific Northwest are said to demonstrate quite conclusively that the false wireworms are among the most destructive insects to recently planted wheat and corn in that region, ranking second only to the true wireworms in importance.

The genus *Eleodes* is very closely confined to the Upper and Lower Sonoran Zones. The beetles do not fly and are therefore comparatively restricted in their distribution. The mass of the species occur in the Southwest, while several occur in the arid and semiarid regions of California, Oregon, Washington, and Idaho. A few species extend into the Carolinian Zone in Kansas, Nebraska, and Iowa, *Eleodes tricolorata* having been collected as far east as Independence, Iowa.

Investigations conducted in the Big Bend region of Washington, briefly reported, are followed by technical descriptions of the egg, larva, pupa, and adult of *E. lecheri vandykei* and *E. pimelioides*. "False wireworms are known to feed on the seed of wheat, oats, and corn, on the tubers of potato, on the fleshy roots of sugar beet, and on several garden crops, as well as on a variety of dead organic matter. . . . The adult beetles have been observed feeding on the seed of wheat and corn, on the leaves of corn, on *Polygonum littorale* and other weed leaves, and on decaying vegetable matter."

The adults of *E. lecheri vandykei*, which emerge from hibernation in the early spring, soon deposit their eggs a few at a time in the ground, the female burrowing down through the soft dust to the moist soil below, usually to a depth of from 2 to 4 in. The average number of eggs laid appears to be about 150. The eggs hatch in about 18 days and the larvæ feed throughout the summer, usually on decaying vegetable matter, hibernates, and resume feeding as soon as the soil becomes warm enough the following spring. At this time they seriously injure spring sown grain. In June they transform to pupæ and early in July the newly emerged adults commence to appear. These adults feed during the remainder of the summer, congregating in large numbers under grain sacks, shocks, and any convenient shelter. They eat a small amount of grain and other vegetable matter and go into hibernation without mating and in the spring resume their activity. While the adults of the species here treated seem normally to live but 1 season, Blaisdell records keeping adults of *E. dentipes* in confinement for over 4 years.

Mention is made of a number of birds, horned toads or lizards (*Phrynosoma* sp.), and the garden toad (*Bufo* sp.), which have been found to feed upon the pest. A microgasterid parasite (*Perilitus* n. sp.) is said to have been reared from an adult *E. suturalis*, received from Belvidere, Nebr. A disease of the larva has also been reported from Nebraska.

The author recommends a modification of the farm practice as now followed. "Disk as early as the land can be worked and the apparatus is available, which will usually be in April. This will conserve the moisture fully as well as plowing. Then plow as late as possible; if the land has been well disked and the men and horses can be spared, it is well to defer this plowing to late July and early August. At this time the beetles are in the pupal, or, as they are commonly called, 'white-worm,' stage. They can not move through the ground as can the

active larvæ, but can merely squirm when irritated. The plowing, which should be deep to be effective, turns out great numbers of these pupæ, and they are either eaten by birds or killed by the burning sun. Many more are destroyed by being crushed or suffocated in the broken pupal cells. Aside from killing many *Elaeodes* pupæ, this practice of late plowing the summer-fallow would greatly aid in weed eradication."

The results obtained through treating the seed with lead arsenate at the rate of $\frac{1}{2}$ lb. per bushel, dissolved in water; strychnin sulphate, at the rate of $\frac{1}{4}$ oz. per bushel, dissolved in water; and coal tar applied until the seed was all coated, then sanded until dry, were entirely negative, as all the plats, including the checks, were about equally attacked.

Technical results from the gipsy moth parasite laboratory.—IV. The chalcidoid genus *Perilampus* and its relations to the problem of parasite introduction, H. S. SMITH (U. S. Dept. Agr., Bur. Ent. Bul. 19, pt. 4, tech. ser., pp. 33-63, figs. 8).—During investigations in the spring of 1909 the author found a first stage larva (for which type of larva Wheeler has suggested the term "planidium") of *Perilampus hyalinus*, in the larvæ of *Limnerium validum*, an important parasite of the fall webworm. Later an adult was reared from a second planidium encountered in a pupa of the tachinid *Varichata aldrichi*, also an important enemy of the fall webworm.

During the following fall several thousand young fall webworm caterpillars were collected and reared to maturity. *Apanteles hyphantriæ* Riley was found to be a fairly common parasite of the younger caterpillars, and *V. aldrichi* and *L. validum* of the older ones, as during the preceding summer. Examination of the puparia and cocoons of the parasites disclosed the fact that the planidia of *Perilampus* were even more common than they were during the preceding year. Maggots of the tachinid which had emerged from the caterpillar were examined and found to contain the planidia internally. "Dissection of the fully developed caterpillars revealed the fact that the tachinid maggots while still within the caterpillar contained these planidia, and going back still further to the younger caterpillars, the planidia were found to be present here irrespective of whether the caterpillar was infested by a primary parasite or not. Examination of a considerable number of the *Hyphantria* caterpillars showed that the planidium could be found in almost any portion of the caterpillar's anatomy, although they generally 'floated about' freely in the body cavity. Occasionally specimens attached to the larval organs, such as the alimentary canal or silk glands, were encountered. Further study of still younger caterpillars revealed the most interesting and significant feature of the whole life cycle, namely, the presence of the planidia upon the exterior of the caterpillars. These were apparently about to make their way through the integument to the interior in a search for suitable hosts upon which to complete their development."

Just how these planidia came to be located upon the skin of the caterpillars and how, when, and where the adult female *Perilampus* places her eggs, could not be ascertained. It is suggested that either the eggs are deposited upon flower heads or upon leaves of plants not in the immediate vicinity of the caterpillar colony, the planidia hatching from these eggs and being conveyed to the caterpillars by means of some intermediate carrier, or, which seems to be more plausible, that the eggs are deposited upon the food plant in the vicinity of a colony of the caterpillars. Dissection of adult female *Perilampus* indicated that the eggs are very numerous, as high as 250 fully developed eggs being found at one time.

Once the planidium becomes affixed to the caterpillar, it makes its way through the thinner portion of the integument found at the junctures of the segments, this passage being effected by means of its well-developed mouth

parts and specially armored head. From the data at hand it seems most likely that the time of attack upon the host larva follows at once upon the finding of another parasite within the caterpillar.

"Just what is the effect upon the caterpillar itself which is infested by *Perilampus* but which contains no primary parasite is a matter for conjecture. It seems likely, however, that its presence would not prevent the caterpillar from reaching its full development and it is probably only slightly inconvenienced if affected at all. . . .

"In case the planidium chooses a maggot of *Varichæta* as its host, it remains endoparasitic until the puparium is formed. During the process of histolysis the *Perilampus* either orients itself in such a manner that it will be external to the tachinid pupa when pupation is completed, or it emerges from the pupa immediately after pupation; in either case, of course, it remains within the puparium. When parasitic upon this host the planidium, so far at least as the writer has been able to learn, normally hibernates in this stage and probably without nourishment."

In the case of the ophionine parasite *L. validum*, which emerges from the older caterpillars in the fall and hibernates as a larva in a silken cocoon, *P. hyalinus* appears always to remain endoparasitic throughout the winter. Dissections of hundreds of the puparia and cocoons brought to light the fact that whether the winter was passed ectoparasitically as upon tachinids, or endoparasitically, as upon *L. validum*, is dependent entirely upon the life cycle of the host parasite, that is to say, the planidium lives internally in its host until histolysis takes place, when it changes its mode of life from an internal parasite to an external parasite.

The other primary parasites of the fall webworm from which the author has reared *Perilampus* are 2 additional species of *Limnerium*, differing from *L. validum* in that they spin their cocoons within the skin of the caterpillar and emerge in the fall, and the braconids *A. hyphantrix* and a *Meteorus*, probably *M. communis*. In all 4 of these species the *Perilampus* completes its development at once. As yet the author has not actually found *Perilampus* to be a parasite of the large solitary ichneumonids *Anomalon ambiguum*, *Ichneumon cinctitarsis*, and *Melanichneumon* sp.

On the return of warm weather in the spring growth takes place gradually, following the completion of which, after a short resting period, ecdysis takes place. After settling down the second time the larva is likely to remain stationary for the rest of the larval (and the pupal) life pupation taking place as soon as it is full fed.

Discussions of the food habits of the adult, longevity and oögenesis, length of life cycle and influence of temperature, effect of parasitism upon the host, percentage of parasitism, superparasitism, description of a second species of *Perilampus* met with, the development of *Orasema viridis*, parasitic principally upon the harvesting ant *Pheidole instabilis*, as described by Wheeler (E. S. R., 20, p. 254), relationship of Eucharidæ and Perilampidæ, Rhipiphoræ and other coleopterous parasites, host relations of the genus *Perilampus*, including a review of European rearing records of *Perilampus*, etc., and the economic aspects, follow.

An internal parasite of Thysanoptera, H. M. RUSSELL (U. S. Dept. Agr., Bur. Ent. Bul. 23, pt. 2, tech. ser., pp. 25-52, figs. 11).—This is a detailed report of studies made of the life history, habits, and economy of the parasite *Thripoctenus russelli*, a summarized account of which has been previously noted (E. S. R., 26, p. 868).

On a new enemy of the grapsvine cochylis, F. PICARD (Bul. Soc. Ent. France, 1911, No. 12, pp. 260, 261; Prog. Agr. et Vit. (Ed. l'Est-Centre), 32

(1911), No. 53, pp. 773-775).—The author reports having found *Odynerus chevricanus* to be an enemy of *Cochylis ambigua* at Castries, in the Department of Hérault.

Two destructive Texas ants, W. D. HURTEX (U. S. Dept. Agr., Bur. Ent. Circ. 148, pp. 7).—The cutting or parnsol ant (*Atta texana*) is known only from a limited area in south-central Texas, which extends from the Brazos River as far north as Waco to the Gulf, westward as far as San Antonio, and southward to the vicinity of Alice. "The ant is most common in the valleys of the Colorado, Guadalupe, Comal, and San Antonio rivers. In these situations it is evidently increasing in numbers from year to year. In many cases the nests occupy the land practically continuously for many miles up and down the valleys. . . .

"The habits of this insect have attracted great attention from scientists and others. The ants cut the leaves from trees and carry them to the nests. Each leaf is finely divided and made into small pellets. In this work the mandibles and legs of the ants are utilized. The small masses are placed upon the so-called fungus garden, where they furnish a growing medium for the growth of a fungus which furnishes the colony with food. As the supply of fungus is consumed, the ants add to the old mass, so that eventually the nests are found to contain large spongy formations on the outer portion of which the slender threads of the fungus are growing. Evidently the ants exercise great care in preventing the contamination of the fungus garden by any but the sole species of fungus that is utilized. . . .

"The distance over which foraging expeditions take place may be 200 yds. or even more. Practically all species of plants seem to be suitable for food, although it is noticeable that only 1 species is attacked at a time. . . . Among cultivated crops, cotton, corn, fruit trees, sorghum, and many others are attacked. Among wild plants, forest trees are favored, and frequently the Spanish moss is used. The various species of oaks seem to be more or less immune, either on account of the texture of the leaves or the tannic acid they contain." In many cases the attack is concentrated on a single tree, which may be defoliated in a night. The damage to growing crops is frequently heavy and complaints have become more numerous in recent years on account of the greater abundance of the ants.

The best method of control is through the use of a potassium cyanid solution made at the rate of 1 oz. to 1 qt. of water. After carefully mixing this liquid, it should be poured into each of the openings, a quart to each opening. In experiments conducted by J. D. Mitchell it was found that the destruction of the entire colony followed after 1 or 2 applications in this manner. The use of carbon bisulphid is not practical on account of the very extensive excavations the ants make in the sand.

The agricultural or hillock ant (*Pogonomyrmex barbatus molestus*) is of economic importance since it will not allow vegetation to grow in the immediate vicinity of its nest and because of the powerful sting which it uses on the slightest provocation. It occurs from the Brazos River westward. West of San Antonio it is replaced by closely allied forms and farther north, in Kansas and Nebraska, a distinct species (*P. occidentalis*) occurs. This ant is conspicuously a resident of open places and does not occur in wooded localities. "The mounds are 15 in. or more in diameter and are frequently covered with particles of earth or sand from beneath the surface which contrast strongly with the surrounding soil. The bare areas around the mound may be 10 ft. or more in diameter."

The most important enemy among the birds is the great-tailed grackle (*Megascopus major macrourus*), commonly known as the jackdaw. Several

additional species are known to prey upon it and the horned toad or lizard (*Phrynosoma cornutum*) includes these ants as a part of its regular diet. The use of a solution of potassium cyanid, as recommended for the cutting or parasol ant, has been found to be a perfectly satisfactory method of destroying them. It is much cheaper and easier of application than in the case of the cutting ant on account of the fact that the underground portion of the nest is much less extensive, a pint of liquid being sufficient for even a large colony, though sometimes a second application may be necessary. Carbon bisulphid is also a good remedy and can be readily applied.

The ants of Guam. W. M. WHEELER (*Jour. N. Y. Ent. Soc.*, 20 (1912), No. 1, pp. 44-48).—This paper is based on a collection made by D. T. Fullaway of the Hawaii Federal Station, which is said to be sufficiently extensive to show that the ant-fauna of the little island is made up very largely of the "tramp" species that occur on the other small volcanic Pacific islands such as those of the Society and Hawaiian groups. Twenty-one forms are recorded, of which a subspecies, *Camponotus reticulatus fullawayi*, and a variety, *Prenolepis minutula atomus fullawayi*, are described as new to science.

The control of *Solenopsis geminata* in cinchona plantations. O. W. BARNETT (*Rev. Agr. [Santo Domingo]*, 6 (1911), No. 10, pp. 255-258; *Os. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, pp. 1541, 1542).—The author recommends the application about the trunks of trees, 2 cm. (0.75 in.) above the soil, of a band from 3 to 5 cm. in breadth, consisting of 3 parts resin, 1 of soda, and 1 of tobacco decoction, and that a second band be placed 15 cm. above the first. For the destruction of ant nests the injection of a mixture of 2 parts resin, 1 of soda, and 1 of tobacco decoction is recommended.

Monograph of the gall-making Cynipidae (Cynipinae) of California. D. T. FULLAWAY (*Ann. Ent. Soc. Amer.*, 4 (1911), No. 4, pp. 331-380, pl. 1).—Fifteen genera are represented in California by 70 species, of which 18 are here described as new to science.

A key to the genera is included.

The red spider (*Tetranychus bimaculatus*) on cotton. E. A. MCGREGOR (*U. S. Dept. Agr., Bur. Ent. Circ.* 150, pp. 13, figs. 5).—This circular, which is based primarily upon work done at Batesburg, S. C., in 1911, but includes the results of observations made by G. A. Runner and H. F. Wilson during the 2 preceding seasons, presents a summarized account of present knowledge of the pest. Recent studies of additional material have led Banks to conclude that the name *T. gloveri* is synonymous with *T. bimaculatus*.

Experiments conducted with unmated female red spiders clearly proved that they are normally capable of laying eggs, which in turn hatch and develop into mature individuals. The female lays from 50 to 60 round, colorless eggs which hatch in the summer time in about 4 days.

The newborn spider molts in 2 days to the primary nymph. "In 2 more days (in summer) it, in turn, molts to the secondary nymph. The second nymphal stage lasts 2 days, at the end of which time, after molting, the fully formed adult emerges. Mating occurs at once and egg laying commences immediately afterwards. Thus, 1 generation requires in summer weather in South Carolina about 10 or 11 days. There are probably about 15 generations in an average year in that locality.

"The red spider colonies live on the under side of the cotton leaves, and their constant feeding causes blood-red spots to appear on the tops of the leaves. The effect upon the cotton plant is that the leaves drop, one by one, until usually the plant dies. The pest increases and spreads most rapidly in hot, dry

weather until (toward the end of July) several acres of a field may become badly damaged."

During the season of 1911, which was one of unusual drought, 17 generations were bred at Batesburg, S. C., between March 11 and November 5. "The influence of the weather on breeding activity is very noticeable. Hot, dry conditions greatly favor and hasten development, while cool, wet weather correspondingly retards it. A female laying normally about 6 or 7 eggs per day will often upon the occurrence of a very hot day, suddenly increase the number to 15 or even more eggs per day, or upon a chilly day may drop as suddenly to 1 or 2 eggs. . . ."

"When cotton dies or becomes untempting in the late fall an exodus of red spiders from the cotton fields occurs in the effort to find more suitable food plants. At this time cotton mites may be easily found on a number of native and cultivated plants, prominent among which are cowpeas, tomato, Jamestown weed, ironweed, and cultivated violets. Most of these plants die after the frosts, but the violet remains somewhat green throughout the winter, and it is upon this plant, probably, that the vast majority of mites overwinter. . . . In all the red spider has been found in 1911 upon over 50 species of plants, including weeds, ornamental plants, and garden and field crops. Upon most of these the pest was only occasionally seen, but it was found commonly throughout the entire season upon beans, cowpeas, dahila, ironweed, Jerusalem-oak weed, Jamestown weed, okra, tomato, wild blackberry, and wild geranium."

In addition to the anthrocorid bug *Triphleps insidiosus*, 3 species of thrips *Euthrips fuscus*, *E. occidentalis*, and *Scolothrips scarnaculata* and several species of lady beetles are mentioned as predaceous enemies of the red spider.

The following remedial and preventive measures are recommended: Burn or rub out all weeds and underbrush about cotton fields and practice fall plowing as far as possible. Spray or destroy suspected violet plants in order to remove the sources of red spider infestation. Thickly sow cotton along margins of fields at points where infestation has appeared on former occasions, and plow these in about June 1, so as to intercept and destroy the invading mites. Maintain a careful watch of fields so that the first attacked plants may be detected, removed, and burned, thus preventing further spread. Apply one of the insecticides described to the infested portion of a field before occurrence becomes so general as to prohibit its use. Two applications should be made; the first to destroy the living mites, and the second, a week later, to kill the recently hatched individuals which were eggs at the time of the first spraying.

All of the following formulas have been found to give good results: Potassium sulphid 3 lbs. to 100 gal. water; flowers of sulphur 15 lbs. and fresh lime 20 lbs. to 100 gal. of water; miscible oil 5 gal. to 100 gal. of water; potassium permanganate, 16½ lbs. to 100 gal. water; miscible oil, 2½ gal. and black-leaf tobacco extract, 40 per cent; and flowers of sulphur, 28 lbs. and soft soap 14 oz. to 100 gal. of water.

Fruit trees damaged by the red spider, R. E. TRUMBULL (*Better Fruit*, (1912), No. 10, pp. 27, 28, fig. 1).—The author reports the red spider to be the cause of considerable injury in the Wenatchee Valley, Wash. In 1911 it was the most serious of the enemies of young fruit trees. "While its attacks are by no means limited to young trees, it does its greatest damage on 2-3- and 4-year-old trees. Often one-half or more of the leaves will be so badly affected that they will fall from the trees, thus limiting the tree's nourishment and checking its growth."

A mosquito larvicide disinfectant and the methods of its standardization, T. DABLING (*Amer. Jour. Pub. Health*, 2 (1912), No. 2, pp. 89-93, fig. 1).—In the course of work by the Canal Zone sanitary department an efficient larva-

cide made from crude carboic acid had been prepared, its particular advantages being cheapness, high larvicidal and germicidal powers, miscibility with water, and relative uniform composition. The work of destroying the algae and mosquito larvae in the Canal Zone requires an average of 250 bbls. per month, and a plant for its manufacture has been in operation for over 2 years.

To make the larvacide 150 gal. of crude carboic acid of a specific gravity not greater than 0.97 and containing not less than 30 per cent tar acids "are heated in an iron tank having a steam coil with steam at 50 lbs. pressure. Two hundred lbs. of finely crushed and sifted common resin are dissolved in the heated acid and then 30 lbs. of caustic soda dissolved in 6 gal. of water are added. There is a mechanical stirring rod attached to the tank. The product is ready in a few minutes, yielding about 3½ bbls."

Its cost is shown to be 14.13 cts. per gallon. "The germicidal value when tested with *B. typhosus* in an aqueous emulsion of the larvacide has an R-D coefficient of from 2 to 5. As a mosquito larvacide it is used by spraying an aqueous emulsion (1 part of larvacide to 5 of water) over the surface and along the margins of pools and ponds or other mosquito breeding places so that the resulting dilution of the larvacide has a thin milky opalescence representing approximately a dilution of 1:5,000."

Anopheline larvae are said to be slightly more resistant than *Culex* larvae and all pupae are more resistant than larvae to the effects of this larvacide.

The author believes that the theory of Chick and Martin^a that the removal of an emulsion of tar acids by bacteria is a process of adsorption and not a chemical combination and that disinfectants of this class possess superior efficiency because owing to this adsorption the bacteria rapidly become surrounded by the disinfectant in much greater concentration than exists throughout the liquid, holds true for algae and protozoa. "When emulsions of larvacide are put up with large quantities of algae, such as *spirogyra*, the larvacide loses its turbidity, 50 per cent being lost in some concentrations within 2 hours. Microscopic examinations fail to disclose a cause for this loss of turbidity."

A table which gives the hour after exposure at which anopheline larvae either die or pupate shows that the efficiency of the larvacide will last for over 7 days. It also shows that when in contact with algae for a period of 1 to 7 days, 70 per cent of the larvae are destroyed within 48 hours. "The larvacide hastens pupation, and the algae control shows that when larvae are placed in contact with fresh algae and fresh water the larvae pupate naturally for several days; decomposition, however, sets in after 110 hours with the formation of a pellicle of bacteria and protozoa on the surface. The anaerobic conditions beneath the pellicle cause the death of algae and larvae."

FOODS—HUMAN NUTRITION.

A report on the milling properties of Idaho wheat, J. S. JONES, H. P. FISHBURN, and C. W. COLVER (*Idaho Sta. Bul.* 72, pp. 65, pls. 2).—Owing to the belief that northwestern grown wheats have a comparatively low milling value, which doubtless materially affects their price in certain markets, extended studies were made of the physical properties, weight per bushel, protein content, and milling value, as well as baking tests under laboratory and home conditions.

The Idaho wheat crop. It is pointed out, consists of a number of varieties grown under very varied conditions, only 3 or 4 being common to north and south Idaho, the two sections of the State where the contrast is greatest in

^a Jour. Hyg. [Cambridge], 8 (1908), No. 5, pp. 698-703.

climate, soil, and methods of harvesting and marketing. Bluestem and Turkey Red are two well-known varieties useful for comparison between north and south Idaho conditions.

According to the authors' summary, it appears that "in weight per measured bushel, of all varieties encountered, Turkey Red, a hard winter wheat, stands highest; Red Russian, a soft winter wheat, stands lowest; indiscriminately between these two stand hard, semihard, and soft wheats of both winter and spring varieties. It would seem, therefore, that regardless of classification with reference to hardness, high, medium, and low weight per bushel is with Idaho wheat a variety characteristic.

"High, medium, and low protein content is likewise a variety characteristic, but it is far from uniform in any one variety. With Turkey Red it so happens that high average weight per bushel is associated with high average protein content; with Red Russian, low average weight per bushel with low average protein content. Nevertheless, within these or any other varieties the relative protein content of several samples can not with any degree of certainty be predicted from relative weights per measured bushel."

The protein content of Bluestem wheat and of Turkey Red wheat grown with irrigation in southern Idaho and with a rainfall of from 24 to 30 in. in northern Idaho is practically the same, while the protein content of Bluestem and of Turkey Red grown on the dry farms of southern Idaho is greater than when grown under irrigated conditions in the south, or under the humid conditions prevailing in the northern part of the State. "If we may generalize from this, within any one variety, on the basis of its protein content, the wheat of north Idaho, and the irrigated wheat of south Idaho, are practically of the same value for milling purposes. South Idaho dry farmed wheat is superior to either."

It is noteworthy, according to the authors, that in many homes where baking tests were made straight flour obtained from the wheats under consideration was given preference over high patent flours which can be secured in the local markets, "a point which perhaps indicates merely that color in flour is of less importance than heretofore it has been regarded in commercial grinding."

From the laboratory and home baking tests the following conclusions are apparently warranted, in the authors' opinion:

"The crude protein and gluten content of flour from any variety of wheat is a consideration of great importance in fixing its value for bread making purposes; a reasonable amount must be present to insure 'lightness.' But from several lots of flour representing as many different varieties of wheat, or from several lots representing but one variety, the best results in baking are not always obtained from those of greatest gluten content. Influence of ingredients used in 'setting' the sponge and the skill of the baker are considerations which should not be lost sight of. Our leading varieties, viz: Bluestem, Forty Fold, Little Club, Red Chaff Club, and Turkey Red, in the north; Bluestem, Colorado No. 50, Defiance, Dicklow, Gold Coin, and Turkey Red, in the south, at their best, are capable of yielding flour sufficiently rich in gluten to insure the finest quality of light bread. If the best variety of milling wheat is the one which most uniformly produces flour from which the most satisfactory results can be secured in baking, then, of all varieties grown in Idaho thus far examined, Turkey Red is the best."

Wheat bread, E. FLEURENT (*Le Pain de Froment*. Paris, 1911, pp. 7+223, figs. 33).—This handbook discusses the composition and nutritive value of wheat and wheat products, bread making, the modern baking industry, and other general questions.

The effect of acids on bread fermentation, A. J. J. VANDERVELDE and L. BOSMANS (*Separate from Verlag. en Meded. K. Vlaam. Acad. Taal en Letterk.*, 1911, pp. 261-286, *dgms.* 4).—From his study the author concludes that under the experimental conditions hydrochloric, nitric, sulphuric, propionic, butyric, and oxalic acid affect bread fermentation unfavorably, and that lactic, tartaric, and citric acid were without effect, while phosphoric, acetic, and benzoic acid had a favorable effect.

He also reports data regarding the effect of these acids upon electrical conductivity, catalysis, inversion, the development of micro-organisms, and other phenomena.

Cotton-seed flour (*Pure Products*, 8 (1912), No. 5, pp. 270, 271, *fig.* 1).—Information is summarized and suggestions made regarding the use of cotton-seed flour for bread making.

Composition of Indian yams, D. HOOPER (*Jour. Asiatic Soc. Bengal, n. ser.*, 7 (1911), pp. 57-62; *abs. in Jour. Soc. Chem. Indus.*, 30 (1911), No. 16, p. 1027).—The results are recorded of analyses of 40 specimens of different species of yams (*Dioscorea*), including both cultivated and wild sorts.

The amounts of crude fiber and ash were much higher in the wild than in the cultivated varieties. Tests showed that an alkaloid (dioscorine) was generally present in the wild tubers (*D. daruma*, *D. bulbifera*, *D. pentaphylla*, and *D. alata*), but not in the cultivated tubers to any great extent. The alkaloid may be removed by soaking the tubers in water.

The narra fruit, H. VON GERARD (*Agr. Jour. Union So. Africa*, 3 (1912), No. 1, pp. 102-106, *fig.* 1).—The use of this wild fruit for food purposes is discussed. In addition to the use of the flesh, the author states that the pits are eaten like nuts and are used for making an oil.

Some Asiatic milk products, D. HOOPER (*Jour. Asiatic Soc. Bengal, n. ser.*, 7 (1911), pp. 63-67; *abs. in Jour. Soc. Chem. Indus.*, 30 (1911), No. 16, p. 1027).—Analyses are reported of 2 samples of karut, a kind of dried skim milk cheese; chhana, a product obtained by acidifying hot milk; and dahi, a product made by fermenting buttermilk.

A study of Turkish honey, F. MUTTELET (*Ann. Falsif.*, 5 (1912), No. 42, pp. 191-194).—Details are given of the examination of 12 samples of Turkish honey.

Marmalades, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul.* 233, 1912, pp. 25).—Details are given of the examination of 154 samples of marmalade collected throughout Canada. Of these, 14 samples contained glucose in amounts varying from traces to about 25 per cent.

Vinegars, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul.* 235, 1912, pp. 31).—Data are reported regarding the examination of 151 samples of goods sold as cider, malt, and wine vinegars.

The aromatic substances of foods and condiments (*Pure Products*, 8 (1912), No. 5, pp. 264-270).—A descriptive summary.

On the absorption and distribution of aluminium from aluminized food, M. KAHN (*Biochem. Bul.*, 1 (1911), No. 2, pp. 235-244).—Tests, 8 in number, were made with dogs and covered from 52 days to 2 months. The general conclusions which were drawn follow:

"When biscuits baked with alum baking powder are fed in a mixed diet to dogs, aluminium passes in considerable amounts into the blood.

"Such absorbed aluminium circulates freely and, although it does not show a tendency to increase proportionately in the blood, it accumulates to some extent in various parts of the body. The bile contains a particularly large amount of aluminium under such circumstances. The pancreas, liver, muscle, and kidneys contain considerable amounts, while the brain and heart seem to

resist accumulation of aluminium. The long bones, under the conditions of these experiments, contained aluminium. The flat bone of the skull did not contain aluminium.

"Aluminium, when ingested in aluminized food under the conditions of these experiments, is absorbed in part and is excreted, to some extent, in both the bile and urine."

The presence of arsenic in some vegetable food materials, F. JADIN and A. ASTROC (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 14, pp. 893-896).—Arsenic was found in a large number of samples of vegetable products and fruits, fresh and dried, nuts, and edible fungi, the amounts ranging from 0.003 mg. per 100 in wild leek (*Allium polvanthum*) to 0.026 mg. per 100 in dried peas.

Food inspection decisions (U. S. Dept. Agr., *Food Insp. Decisions* 143, 144, pp. 1 each).—These decisions have to do respectively with the labeling of candied citron and the use of excessive amounts of water, brine, sirup, sauce, and similar substances in the preparation of canned foods.

The sanitary regulation of the oyster industry, F. P. GORMAN (*Amer. Jour. Pub. Health*, 2 (1912), No. 2, pp. 77-84).—From the data summarized the author concludes that the improvement of the shellfish industry involves "prohibition of the practice of floating oysters; prohibition of the use for food of shellfish taken from waters directly polluted with sewage, that is, within a certain distance of discharging sewers; careful sanitary regulation and supervision of the methods of handling and packing shellfish; [and] efforts to secure the removal of sewage pollution from the tidewaters where shellfish are grown, or at least the disinfection of all sewage effluents which enter tidewater."

The paper is followed by a discussion.

The preservation of food, ALICE RAVENHILL (*Brit. Columbia Dept. Agr. Bul.* 77, 1912, pp. 19, figs. 10).—This bulletin, which is one of a proposed series for the women's institute work, discusses methods of handling and keeping food, the preservation of foods in the home, and other similar questions.

Southwest Africa camp food, H. FISCHER (*Illus. Landw. Zig.*, 32 (1912), No. 26, pp. 246, 247, figs. 3).—Native foods are described and their uses discussed.

How I lived on threepence a day, F. J. CROSS (*London*, 1912, pp. 124, charts 8).—The author reports and discusses his experience living for a week on a diet costing 6 cts. a day, a sum which he states is comparable with that which many workingmen's families have to spend per person for food. His general conclusion is that, with limited incomes, knowledge and care in the selection and preparation of food are absolutely essential if persons are to be well nourished. In addition, the volume, which is designed for the instruction of housekeepers, discusses such subjects as the relative nutritive value of different foods, suitable foods for working class households, and other questions.

The introduction is contributed by R. Hutchison.

Cooperation and cost of living in certain foreign countries (U. S. House Representatives, 62. Cong., 2. Sess., Doc. 617, 1912, pp. 248).—A large amount of data collected by United States consuls, regarding the cost of food, the work of cooperative societies, and the cost of living in certain foreign countries, is brought together, this material being preceded by a letter of transmittal by H. Wilson which gives a summary of the prices of common food materials in recent years in the United Kingdom.

The school feeding movement, LOUISE S. BEYANT (*Psych. Clin.*, 6 (1912), No. 2, pp. 29-43).—An account of the origin and development of the movement

to provide food for school children, which summarizes a large amount of statistical and other data.

A bibliography is included.

The training of the school dietitian, MARY S. ROSE (*Psych. Clin.*, 6 (1912), No. 2, pp. 52-55).—Suggestions are made regarding the training required by a school dietitian, a profession which the author believes will become an important factor in education in boarding institutions and in the public schools of large cities.

Administration of school luncheons, ALICE C. BOUGHTON (*Psych. Clin.*, 6 (1912), No. 2, pp. 44-51, fig. 1).—An account is given of the school luncheon movement in Philadelphia, considered particularly as a business project.

The economy of food, J. A. MURRAY (*London*, 1911, pp. XII+253, figs. 13).—This popular treatise on nutrition discusses the physiology and chemistry of nutrition, the quantity of food required, the nutritive value and general properties of meats, vegetables, and other foods, ordinary diets, special diets, and similar questions.

An explanation of hunger, W. B. CANNON and A. L. WASHBURN (*Amer. Jour. Physiol.*, 29 (1912), No. 5, pp. 441-454, figs. 3).—In this paper the authors summarize and discuss hunger as distinguished from appetite, on the basis of their own investigations and the work of others. Of the two theories of hunger, the one that it is a general sensation with a local reference, and the other that it has a local peripheral source, they point out that the former has been the more widely accepted. The support for this theory, however, can be shown to be unsubstantiated.

In general, "hunger . . . is normally the signal that the stomach is contracted for action; the unpleasantness of hunger leads to eating; eating starts gastric secretion, distends the contracted organ, initiates the movements of gastric digestion, and abolishes the sensation. Meanwhile pancreatic and intestinal juices, as well as bile, have been prepared in the duodenum to receive the oncoming chyme. The periodic activity of the alimentary canal in fasting, therefore, is not solely the source of hunger pangs, but is at the same time an exhibition in the digestive organs of readiness for prompt attack on the food swallowed by the hungry animal."

Investigations into the jail dietaries of the United Provinces, with some observations on the influence of dietary on the physical development and well-being of the people of the United Provinces, D. McCAY (*Sci. Mem. Med. and Sanit. Depts. India*, n. ser., 1911, No. 48, pp. 2+3+II+200).—Continuing previous investigations (*E. S. R.*, 24, p. 568), an extended study was made of the dietaries in a number of Indian jails and experiments were carried on with reference to the digestibility of protein and carbohydrates of certain food-stuffs and combinations. In addition, the author studied the jail dietaries with reference to their salt content, the excretion of chlorids in the urine, the quantity of feces and urine excreted, the nitrogen content of the feces, and the effect of an increase or decrease in wheat consumed on the quantity of feces.

On an average the present diet made up of wheat, legumes, barley, vegetables, oil, and other similar vegetable foods, supplied 106.81 gm. protein per man per day, of which 72.81 gm. was digestible. The energy value ranged from 3,122 to 3,450 calories.

"Taking the whole year into consideration the dietaries of the jails of the United Provinces present an average daily intake of . . . 104.66 gm. protein per man, and are accompanied by an average daily absorption of . . . 69.50 gm. protein per man."

In the author's opinion "the defects of most of these diets are such as to lessen their nutritive value to a very serious extent, with the result that while

according to their chemical composition, they appear to be superior to the English prison scales and even to most of the standard dietaries, in reality they are much inferior. The explanation for this will be found to be the low degree of protein absorption shown by the foodstuffs entering into the composition of the dietaries of the jails of the United Provinces."

Studies of digestibility showed a considerable range. The coefficient of digestibility of protein of ordinary jail wheat was found to be 67.1 per cent, a value considerably lower than that of first quality wheat. In general, the digestibility of the legumes studied was also lower than that of first quality wheat. The average digestibility of total carbohydrates in the jail dietaries was found to be 96.4; the carbohydrates of wheat, 96.5; and, in general, 92 per cent or over for the individual materials and combinations under consideration.

The author does not believe that the present dietaries contain an excessive amount of protein. "While acknowledging the force of the different arguments for the reduction of the level of protein metabolism, we have had sufficient evidence in our work in India to confirm us in the opinion that a liberal supply of absorbable protein is the all-important element of a diet, without which, no matter how plentiful the other constituents may be, physical fitness, capacity for work, and power of resisting disease can not be expected."

On the basis of the investigation a number of suggestions are made for improving the dietaries and for making them more economical. A series of 8 diets is given which are practically of identical nutritive values, and interchangeable, the particular diet in use at any stated time depending on the season of the year and on the food materials available.

In the section which deals with the relationship of food to physical development much detailed information is given regarding the food and physical condition of Brahmins, sikhs, Pathans, and other natives. In some cases the diet is principally vegetarian; in others vegetables and dairy products are used; while in others a mixed diet is followed.

In general, it is the author's opinion that the more generous the diet the more satisfactory the physical condition and general well-being. "From the facts we have been able to collect with regard to the inhabitants of the United Provinces and martial races of the plains, there would appear to be abundant evidence that, other things being equal, diet is the all-important factor in determining the degree of physical development and general well-being of a people, and that with a low level of nitrogenous interchange deficient stamina, morally and physically, must be expected."

The effect of a strictly vegetable diet on the spontaneous activity, the rate of growth, and the longevity of the albino rat, J. R. STONAKER (*Leland Stanford Jr. Univ. Pubs., Univ. Ser., 1912, pp. 36, pl. 1, figs. 15*).—Using 2 groups of young rats the same age and as nearly as possible of the same parentage, the author studied the effects of a vegetable diet in comparison with the same diet plus animal food.

According to his conclusions, the omnivorous feeders were more active and voluntarily did much more work than the rats on a vegetarian diet, the average ratio of efficiency being 7.5:1. The females surpassed in activity the males of the same group, the difference being greater with the omnivorous rats than with those receiving the vegetable diet. The difference was not very noticeable until the experiment had proceeded 2 or 3 months or until about one-fifth of the total life of the rats on the vegetable diet had been lived. "One can not conclude, therefore, that a diet used for a few weeks is not injurious if no bad results occur during that time."

"The total work accomplished by the vegetarians during their life was performed by the omnivorous rats when but 20.9 per cent of their lives had been lived.

"The vegetarian rats age much earlier in life, it requiring almost half their lifetime to perform the last one-eighth of their life's work, as compared to three-tenths for the omnivorous rats.

"The growth of the vegetarians was greatly retarded. The ratio of maximum weights was a 1.62:1 in favor of the omnivorous feeders.

"The effect on general conditions of the body was most overwhelmingly in favor of the omnivorous. The vegetarians were frail, weak, and showed extreme lassitude and indifference. The omnivorous were the reverse in all these respects.

"The average life of the omnivorous was 1,020 days, that of the vegetarians 535 days. This was a ratio of 1.84:1.

"The control rats in stationary cages lived longer than the exercised rats of the same group.

"All of the omnivorous rats surpassed the greatest age attained by the oldest vegetarian rats.

"From numerous observations and experiments of other investigators on man we would infer that similar results would obtain if he were subjected to similar conditions throughout his lifetime."

Effects of coffee drinking upon children, C. K. TAYLOR (*Psych. Clin.*, 8 (1912), No. 2, pp. 56-58).—Statistics were obtained from 464 children with respect to coffee drinking, and physical measurements were made, as well as observations regarding the character of their school work.

It was found that about 29 per cent of these children drank no coffee, 43 per cent a cup a day, 12 per cent 2 cups, 8 per cent 3 cups, and the remainder 4 or more cups a day. The statistics obtained, according to the author, "are hardly sensational," but he believes that "if such differences exist between the mental ability, as shown by lesson work, and behavior, as shown by conduct marks, of those drinking and those not drinking coffee, this beverage must have some unwholesome effect upon children that it does not have upon adults."

As regards physical measurements, "the children concerned in this test who drank coffee regularly averaged from 1½ to more than 4 lbs. less in weight, from ½ in. to more than 1 in. less in height, and all the way to 3 lbs. less in hand strength than those who never drank coffee. These differences may not be startling, but it is evident that there are differences.

"As a conclusion, then, to this very brief paper, the writer would say that it seems likely that the regular drinking of coffee by children has an effect which is certainly not beneficial, that indeed it seems to make children less 'fit' physically as well as mentally than those who do not use coffee. If this be true, then some support is given to the modern movement which advocates the substituting of cocoa or chocolate for coffee as a beverage for children."

The cleavage of xanthin and caffein in the human body, W. LEVINTHAL (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 77 (1912), No. 4, pp. 259-279).—From an experimental study of the subject the conclusion is reached that very probably the xanthin metabolized by man is excreted quantitatively without breaking the purin ring, the greater part being oxidized to uric acid and the small remainder leaving the body unchanged.

On fat absorption, W. R. BLOOR (*Jour. Biol. Chem.*, 11 (1912), No. 4, pp. 429-434).—The results obtained in experiments with dogs show quite conclusively, according to the author, "that none of the isomannid esters had passed unchanged into the chyle, although considerable quantities had been digested and absorbed." This result, which is in accord with work which has been

previously reported, "emphasizes the probability that readily saponifiable fatty acid esters do not escape saponification under the favorable conditions in the normal intestine (excess of lipase, rapid removal of the products). Whether fatty substances of any kind may pass into the chyle unchanged remains to be proven."

The chemical analysis of the ash of smooth muscle, E. B. MEIGS and L. A. RYAN (*Jour. Biol. Chem.*, 11 (1912), No. 4, pp. 401-414).—Experiments are reported and data summarized. According to the authors, the facts at present known point to the following conclusions in regard to smooth muscle:

"The fibers of this tissue are not surrounded by semipermeable membranes.

"Most of the water of the smooth muscle fibers is held by the colloids of the living tissue as organic water.

"Most of the potassium, phosphorus, sulphur, and magnesium, which appear in the ash of smooth muscle, are present in the living tissue in a nondiffusible form."

Metabolism during mental work, A. LEHMANN (*Umschau*, 16. (1912), No. 13, pp. 390, 391).—A brief summary of a paper presented at the Congress of Experimental Psychology in Berlin. The mental work in the experiments consisted in adding simple numbers or in committing to memory syllables arranged without reference to meaning.

The author concludes that under controlled conditions such mental work caused an increase of carbon dioxide excreted which is directly comparable with that noted in the case of physical work. The increased carbon dioxide production was proportional to the severity of the mental work as measured by attention.

A new ice chest, C. ZELMANOWITZ (*Biochem. Ztschr.*, 39 (1912), No. 1-2, pp. 151-154, fig. 1).—An ice chest designed for laboratory use is described in which a current of air is driven into the ice chamber and kept in continuous circulation by means of a small electric motor. The front of the ice box contains a number of small doors, the object being to lessen the rise of temperature when articles are placed in it or removed. Even when due allowance is made for the cost of the motor and power, the ice chest has been found more economical than one cooled with ice in the usual way, according to the author.

[The ideas embodied in the construction of this ice chest might prove useful in ice chests for institution use or for some similar purpose.]

ANIMAL PRODUCTION.

The vitality of reproductive cells, L. I. LEWIS (*Oklahoma Sta. Bul.* 96, pp. 3-47, figs. 7).—This contains a description of the reproductive glands of horses, cattle, swine, and mules, and a report of experimental work on the vitality of spermatozoa and ova, being a continuation of earlier work (see page 274).

Measurements of the sperm cells from horses, cattle, and swine are given, showing that there was but little variation in size for different individuals of the same species. In a number of experiments in keeping semen of stallions at temperatures from 12 to 52° C., the high temperatures were found to be quickly fatal to the sperm cells. Keeping the semen in rubber and pig bladder, or adding water or other materials, reduced the vitality. Semen-like material from male mules contained no sperm cells.

"Under experimental conditions the vitality of the sperm cells from the boar continues approximately 15 to 25 hours after the semen is collected. The length of time depending upon the temperature at which the semen is kept, and the vigor and physical condition of the animal used in the experiment. Temperature has much the same effect on the vitality of the semen from the

hog as it has on that collected from the horse. . . . Semen from different males varies greatly in its vitality under laboratory conditions. This difference is sometimes so noticeable as to indicate the probability of poor breeding qualities."

To determine the vitality of sperm cells in the female, sows were killed at varying lengths of time after service. Of the 19 sows bred and killed the sperm cells were found dead in 80 per cent of the cases where a period of 16 hours or more had elapsed. In one case the live cells were found after a lapse of 22½ hours, and in 2 cases after a lapse of more than 40 hours. Vitality tests with the sperm of horses showed it to be very short-lived either in the mare or under abnormal conditions.

To learn of the effect of continuous service, a heavy draft stallion was used once each day. The number of sperm cells present in the semen in his first service was 131,750 per cubic millimeter, and live cells were found 95 hours after service when kept at from 31 to 35° C. After the ninth service there were only 5,840 sperm cells per cubic millimeter, and the vitality of the cells was less than one-half as compared with those of the first cells. Other experiments for 11 days' and 18 days' consecutive service showed that the vitality was reduced from the first to the last service. Chemical analyses of the sperm cells are given.

Experiments were also made to determine the time of the rupture of the Graafian follicles and the vitality of the ova in sows. "If the hog was killed early in the period of heat the follicles showed perfect and unruptured, while those from hogs killed a few hours later showed the follicles ruptured. A few sows were killed when not in heat, and in none of these were the follicles found well developed or in condition to liberate the ovum, neither did they show any signs of the recent escape of the ovum from the organ. Variations from the normal no doubt do occur, but it is safe to assume that in the great majority of cases the follicles do not rupture before 30 hours after the period of heat begins." Whenever sows were bred out of heat no results were obtained unless it occurred within 1 day. Post-mortem examinations after breeding out of heat indicate that the ovum and sperm cells soon lose their physiological activity after they become separated from the ovary and testes.

"The vitality of the reproductive cells of the hog is only a few hours. In most cases the ovum appears to lose its power of being fertilized within 48 hours, and the sperm cell does not appear to possess much, if any, greater vitality. . . . The ovum (in hogs) is not liberated from the ovary until the last part of the period of heat."

Artificial insemination, L. L. LEWIS (*Oklahoma Sta. Bul.* 93, pp. 3-14, figs. 5).—A revised edition of a bulletin previously noted (*E. S. R.*, 17, p. 1193), with a brief report of experiments which are more fully noted in Bulletin 96 (see page 273).

Is the control of embryonic development a practical problem? C. R. STOCKARD (*Abstr. in Science, n. ser.*, 35 (1912), No. 907, p. 788).—This is an abstract of a paper read before the American Philosophical Society, 1911, which discusses the factors which cause embryonic deformities in man and animals. These may be distinguished as those caused by the embryo developing in an unfavorable environment, and those in which the germ cells of both parents may have been defective.

The results of experiments with guinea pigs have shown that when put into a state of chronic alcoholism and mated together or with normal individuals, the resulting offspring were greatly affected, showing that the paternal germ cells are affected by the alcohol and produce abnormal offspring. It is sug-

gested that there may be some means of controlling the chemical environment of the developing germ.

On Mendelian dominance, A. R. MOORE (*Arch. Entwickl. Mech. Organ.*, 34 (1912), pt. 1, pp. 168-175, figs. 9).—In support of a hypothesis, previously noted (E. S. R., 23, p. 778), the author cites a number of experiments with invertebrates by which incomplete dominance can be explained on biochemical grounds.

"According to our hypothesis that the substances underlying the formation of dominant characters obey the laws governing enzym reactions, we should expect these reactions to go forward at a slower rate in the heterozygote than in the pure dominant because the former contains but one-half the amount of enzym to be found in the latter."

A simplified method of calculating frequencies of occurrence from a large number of unequal probabilities, A. G. MCKENBICK (*Biometrika*, 8 (1912), No. 3-4, pp. 413-419).—This biometric method of determining whether the distribution is regulated by laws of chance or by other factors is illustrated by applying it to a study of the recurring attacks of disease in epidemics.

Factors affecting the secondary sexual characters, E. STEINACH (*Zentbl. Physiol.*, 24 (1910), No. 13, pp. 551-560; 25 (1911), 17, pp. 723-725; *Jour. Amer. Med. Assoc.*, 58 (1912), No. 7, p. 484).—Testes and ovaries of rats and guinea pigs were transplanted into early castrates of the same and the opposite sex. The tissues maintained their integrity and exerted an influence on the sex characters. Neither the somatic nor the psychic secondary traits were fixed in the individual. They developed under the domination of the respective glands which were present and functionally active.

Contribution to the study of experimental determination of sex, I. BONAZZI (*Arch. Ital. Biol.*, 56 (1911), No. 3, pp. 433-447, figs. 8).—Following the methods used by Ducceschi and Tallarico^a an orchitoxic serum obtained from sheep was injected into rabbits. It was without apparent influence on the sex ratio but had a tendency to produce sterility and abortion. This opinion was confirmed by an examination of the ovarian tissue of the treated rabbits.

Another sex-limited character in fowls, A. H. STURTEVANT (*Science, n. ser.*, 33 (1911), No. 844, pp. 337, 338).—A preliminary report of experiments in crossing Columbian Wyandottes and Brown Leghorns.

An experiment dealing with sex-linkage in fowls, A. H. STURTEVANT (*Jour. Expt. Zool.*, 12 (1912), No. 4, pp. 499-518, figs. 4).—A continuation of work noted above, and summarized as follows:

"There is a sex-linked factor carried by the Columbian Wyandotte—an inhibitor for red in the plumage. This breed probably also carries another sex-linked factor, an inhibitor for red in the neck. It apparently carries a pattern factor inhibiting the breast color, and, in the female, the stippled back of the Brown Leghorn. The silver-gray color is probably epistatic to the Jungle fowl or brown color. The White Wyandotte is a silver-laced breed with a color producer dropped out.

"An attempt is made to explain three sets of phenomena, in fowls, in canaries, and in *Agilia tau* respectively, as cases of partial sex-linkage. Using this explanation, it is argued that the sex formula for birds and Lepidoptera is probably: ♂, MM, FF; ♀, Mm, Ff. The case of the dwarf guinea pig is explained as perhaps representing partial sex-linkage in a form where the male is heterozygous for sex."

A bibliography is appended.

^a *Arch. Physiol.*, 1 (1904), p. 604.

The correlation of body weight and egg production in fowls, G. WIENING (Wiener Landw. Ztg., 62 (1912), No. 26, pp. 320, 321).—Some of the results obtained from a study of the correlation between the weight of the hen and of the eggs laid are summarized in the following table:

Average weight of hens and of eggs laid per hen.

Breed.	Average weight of hen.	Average total weight of eggs per year.	Average weight of 1 egg.
Italian partridge:	Kg.	Kg.	Gm.
General average of the flock for 7 years.....	2.259	7.865	56.1
Average of 5 best layers.....	2.125	8.730	57.8
Average of 5 poorest layers.....	2.409	6.849	56.5
Golden Wyandotte:			
General average of the flock.....	2.549	8.641	57.3
Average of 5 best layers.....	2.476	10.245	57.2
Average of 5 poorest layers.....	2.650	6.743	57.1

Hybridization of canaries, A. R. GALLOWAY (*Biometrika*, 8 (1912), No. 3-4, pp. 435, 436).—An explanatory note concerning the author's paper, previously noted (*E. S. R.*, 22, p. 172).

[The significance of the chemistry of the proteins in animal nutrition], T. B. WOOD (*Trans. Highland and Agr. Soc. Scot.*, 5. ser., 23 (1911), pp. 84-93).—The aim of this article is to show the practical value to the stock feeder of the new points of view of the physiological chemists in regard to proteins that the value of a protein may vary greatly according to the amino acids into which it may be decomposed. The quantity of protein necessary for an animal varies considerably, being smaller the nearer the composition of the protein of the feed approaches that of the protein of the animal tissues. As farm stock nearly always received a mixed diet, the constituents of which can be varied within certain limits, these mixtures are ordinarily successful because the protein of the several ingredients of the diet are complementary to each other.

Experiments are cited to show that the successful stock feeder of the future must know something of the nature of the amino acids contained in the proteins of the different feeding stuffs.

Starch values and fodder units, O. JENSEN (*Milchz. Zentbl.*, 41 (1912), No. 6, pp. 161-165; *Molk. Ztg. Berlin*, 22 (1912), No. 19, pp. 217, 218).—This gives the author's views regarding the formulation of rations by means of starch values and fodder units.

Starch values and fodder units, trans. by J. H. MONKAD (*Hoard's Dairyman*, 43 (1912), No. 15, pp. 586, 587, 590).—This is a translation of the above.

[Alpine pasture lands], E. MARCETRANO (*Separate from Bol. Assoc. Agr. Friulana*, 1911, pp. XV+150, map 1; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 2, pp. 514-521).—A general statistical article on Alpine pasture lands in the Province of Udine, Italy, with special reference to the work of the agricultural association of Friuli.

The rate of evolution of hydrocyanic acid from linseed under digestive conditions, S. H. COLLINS (*Proc. Univ. Durham Phil. Soc.*, 4 (1911-12), No. 3, pp. 99-106, figs. 2).—Linseed meal was digested at temperatures approaching those of animal life, and the hydrocyanic acid and other volatile products removed by a stream of inert gas. The amount of hydrocyanic acid produced depended upon the amount of cyanogenetic glucosid, the amount of enzyme, the temperature, and the degree of acidity of the liquid, as well as on the presence or absence of a number of other substances. The conclusion is

reached that in normal health, the acidity of the stomach is too high for the production of hydrocyanic acid from linseed, but abnormal circumstances may cause its production.

"The above research explains the paradox that while a farmer considers linseed one of the safest cattle foods and uses it for calf rearing, yet the chemist shows that linseed in the laboratory readily gives off prussic acid, one of the most deadly poisons.

"Further, this research suggests a possible explanation of certain rare and puzzling cases of cattle poisoning. Should a linseed, rich in cyanogenetic glucosids, be fed to a beast suffering from indigestion of such a peculiar character that the food was not rendered acid, then prussic-acid poisoning might set in. Such a combination of circumstances must be very rare, but is by no means impossible."

The Pandacan forage factory, Z. K. MILLER (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 3, pp. 133-141).—Brief reports are made on drying and storing corn, testing grain rations, and artificially drying forage.

Experiments made in crushing and drying grasses and green forage plants showed that the cost was too high to be practicable. The experiments will be repeated when a more economical dryer is obtained, as artificial drying of forage is a necessity during the rainy season, or until irrigation systems can be installed so that forage plants can be grown in the dry season.

Cooked yeast as a feed for cattle, J. PAECHTNER (*Wehnschr. Brau.*, 29 (1912), No. 16, pp. 225-227, fig. 1).—Methods of utilizing waste yeast from breweries as a feed for live stock are discussed, and a contrivance for cooking fresh yeast by means of a coiled steam pipe is described.

Cattle breeding, H. WERNER (*Die Rinderzucht. Berlin*, 1912, 3. ed., rev. and enl., pp. XII+756, pls. 128, figs. 106).—In this revision many changes have been made, especially in the sections devoted to breeding and feeding.

The organization of the bovine breeding societies in France, M. VACHER (*Jour. Soc. Cent. Agr. Belg.*, 59 (1912), No. 6, pp. 153-162).—This discusses the nature of the cattle breeders' associations in France and the results which they have accomplished.

The origin and ancestry of Norwegian cattle, J. FROST (*Milchwe. Zentbl.*, 41 (1912), No. 4, pp. 117-121).—According to the author's views, which are similar to those of Dettweiler (*E. S. R.*, 26, p. 166), the first domesticated cattle and horses in Norway were brought from Freisland or Jutland in Neolithic times, are of the same origin as the Finnish stock, and are black or black and white in color. Red cattle were introduced at a later period and are of German origin.

The important blood lines of the black and white East Friesian cattle, GROENEWOLD (*Arb. Deut. Gesell. Züchtungsk.*, 1912, No. 13, pp. 101, tables 10, pls. 17).—This contains pedigrees, milk records, photographs, and other data of many noted animals of this breed.

The Harz cattle, GEORGS (*Mitt. Deut. Landw. Gesell.*, 27 (1912), No. 19, pp. 276-279).—A description of the characteristics of the cattle in the region of the Harz Mountains, and a discussion of the methods of feeding, breeding, and managing.

Imported stock and their progeny, M. A. O'CALLAGHAN (*Agr. Gaz. N. S. Wales*, 23 (1912), Nos. 2, pp. 95-108, pl. 1, figs. 11; 4, pp. 315-332, pls. 4, figs. 13).—Milk records and other data of cows imported to New South Wales, belonging to the Shorthorn, Ayrshire, Jersey, and Guernsey breeds, are reported.

Caracul sheep, H. KRAEMER (*Mitt. Deut. Landw. Gesell.*, 27 (1912), No. 17, pp. 243-246).—A discussion of the effect of soil, climate, feed, and other factors

on the character of the fleece of caracul lambs, based largely on results of work previously noted (E. S. R., 25, p. 175).

Goats: Their use and management, H. S. H. PEGLER (*Trans. Highland and Agr. Soc. Scot.*, 5. ser., 24 (1912), pp. 52-77, figs. 6).—The principal topics treated are the breeds of goats, feeding, management, and milk yields.

The Angora and mohair industry in the Northwest (Portland, Oreg. [1911], pp. 69, figs. 54).—This is a report of the proceedings of the first annual convention of the Northwest Angora Goat Association, held at Portland, Oreg., January, 1911, including several addresses on the subject of breeding, feeding, and handling goats.

[Feeding experiments with pigs], W. A. LINKLATER (*Oklahoma Sta. Rpt.* 1910-11, pp. 18-30, figs. 5).—A feeding test with 32 young pigs is summarized in the following table:

Rations for growing pigs.

Rations.	Average gain per head and day.	Corn required for 100 lbs. gain.
	Lbs.	Lbs.
Corn meal (full ration).....	0.38	407
Corn meal (full ration), green alfalfa (ab libitum).....	.52	284
Corn meal (half ration), green alfalfa (ab libitum).....	.38	293
Corn meal (quarter ration), green alfalfa (ab libitum).....	.22	136
Corn meal (quarter ration), green rape (ab libitum).....	.12	242
Corn meal (half ration), green rape (ab libitum).....	.26	293
Corn meal (full ration), green rape (ab libitum).....	.46	333
Corn meal (7 parts), tankage (full ration), 1 part.....	.89	347

In another test with 20 pigs lasting 160 days, on a ration of corn chop, butter milk, and barley and sorghum forage the average daily gain was 0.51 lb., as compared with a gain of 1.22 lbs. on corn chop and buttermilk. A lot of hogs turned into a field of corn yielding at the rate of only 17 bu. per acre made a gain of 1.2 lbs. per head. Estimating the value of the grain at 7 cts. per pound, the hogs returned a value of 63.15 cts. per bushel.

A test of ear corn v. ear corn and supplementary feeds for 16 hogs averaging about 209.5 lbs. in weight gave the following results: On ear corn alone the average gain per head and day was 1.02 lbs., at a cost of 4.57 cts. per pound; on corn and tankage, a gain of 1.09 lbs. at a cost of 4.74 cts. per pound; on corn and alfalfa meal, a gain of 1.02 lbs., at a cost of 5.3 cts. per pound; and on corn and alfalfa hay, a gain of 0.96 lb., at a cost of 5.76 cts. per pound.

Hog feeding, W. A. LINKLATER (*Oklahoma Sta. Bul.* 94, pp. 3-16, figs. 2).—The first experiment reported in this bulletin was on the value of alfalfa forage for hogs with and without grain. Pigs averaging about 75 lbs. in weight were turned on an alfalfa field in April. At the end of 100 days the average daily gain was 0.26 lb. per head when on alfalfa alone; on alfalfa and all the dry corn chop they would eat the gain was 1.23 lbs. per head and day; on alfalfa and a half ration of corn chop the gain was 0.70 lb.

In a test of the value of cotton-seed meal as a supplementary feed, with 3 lots of 4 hogs each weighing about 100 lbs., the average daily gain per head for 77 days was as follows: On corn chop and cotton-seed meal in the proportion of 4:1, 1.05 lbs.; on the same feeds in the proportion of 6:1, 1.2 lbs.; in the proportion of 8:1, 1.18 lbs. The financial statements, however, were most favorable for the first lot.

Some advice was offered concerning the management of swine and the economical production of pork.

the brood sow and her litter, J. M. EVVARD (*Breeder's Gaz.*, 61 (1912), No. 7, p. 395, figs. 2).—Thirty-five grade and pure-bred Duroc-Jersey gilts were divided into 7 equal lots. Corn was made the basis of all rations fed. The supplements tested were meat meal, mixed grains, clover hay, molasses, and alfalfa. The results are summarized in the following table:

Influence of the sow's feed on the offspring.

Supplement.	Average number in litter.	Average weight of litter.	Average weight per pig.	Average number of pigs saved per sow at weaning.
Note.....	7.6	Lbs. 13.20	Lbs. 1.74	5.2
1 lb. meat meal to 30 lbs. ear corn.....	7.4	14.89	2.01	6.2
4 lbs. meat meal to 30 lbs. ear corn.....	8.8	19.62	2.23	7.0
Grain mixture.....	10.6	19.50	1.84	7.4
Cut clover and molasses.....	7.0	15.32	2.19	4.6
Clover in rack.....	6.4	14.17	2.21	5.6
Alfalfa in rack.....	7.6	17.41	2.29	6.4
Average of all.....	7.9	16.30	2.07	6.1

a Average weight of all pigs born.

Bacon curing on the farm, L. M. DOUGLAS (*Trans. Highland and Agr. Soc. Scot.*, 5. ser., 24 (1912), pp. 102-119, figs. 12).—This describes the bacon type of hog, the equipment for curing bacon, and methods of cutting and curing.

The stallion law and the farmer (*Kansas Sta. Circ.* 23, pp. 4).—This circular explains the reason for enacting the state stallion law, and offers suggestions to horse breeders for improving their breeding stock.

Profitable poultry raising, J. S. JEFFREY (*North Carolina Sta. Bul.* 221, pp. 89-108, figs. 7).—This discusses methods of raising and feeding chicks, and contains a brief report of a feeding experiment lasting 6 months, in which a large part of the feed consisted of grain that was not marketable. The cost of feed per dozen eggs laid during this period was 9 cts. for the Barred Plymouth Rocks and 8.45 cts. for the Rhode Island Reds. Types of poultry houses and an oat sprouter are also illustrated and described.

The utility poultry industry in Scotland, W. BROWN (*Trans. Highland and Agr. Soc. Scot.*, 5. ser., 24 (1912), pp. 236-249).—This is a statement of the present status of the poultry industry, a description of the efforts now being made to encourage poultry keeping, and a review of results which have already been secured.

Farm poultry, F. C. ELFORD (*Bul. Macdonald Col.*, 1912, pp. 59, figs. 31).—This is a popular bulletin, covering all phases of the poultry industry.

Exportation of eggs from Bulgaria (*Handels Museum*, 26 (1911), I, No. 21, p. 327; obs. in *Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, p. 1428).—Statistical data on exports of eggs from Bulgaria for a number of years are given. Most of the eggs at the present time are sent to Germany, whereas formerly they were exported to Austria.

Oregon Station trap nest, J. DRYDEN (*Oregon Sta. Circ.* 19, pp. 4, figs. 2).—A description of this trap nest has been previously noted (*E. S. R.*, 21, p. 75).

The retail butcher, R. S. MATTHEWS (*Memphis, Tenn.* [1911], pp. 191, pl. 1, figs. 4).—This contains advice on slaughtering animals, and also recipes for curing ham and bacon, drying beef, and making sausage and head cheese. Prices at which meat must be sold in order that the butcher may make a profit are presented in tabular form.

DAIRY FARMING—DAIRYING.

Influence of fatness of cow on percentage of fat in milk, C. H. ECKLES (*Missouri Sta. Bul. 100, pp. 183-202, figs. 12*).—This contains records of the station herd in addition to those previously noted (*E. S. R., 23, p. 179*), which show that on a restricted ration the percentage of milk fat may be abnormally increased for some time after calving if the cow is in a fat condition, and that the percentage of milk fat gradually increases with the advance in lactation for the cows moderate to thin in flesh.

Data are also taken from the advanced register of the Holstein-Friesian Cattle Association, and submitted as further proof that the percentage of fat may be abnormally high when the cow is in a fat condition at calving. One cow was entered in the advanced register with an official test of 4.09 per cent fat, although her average for the year was 2.76 per cent. Similar results are recorded for Ayrshires and Jerseys.

The following conclusions are drawn: "The percentage of fat in milk can be influenced to a marked extent for the first 20 to 30 days by the fatness of the animal at parturition. This influence appears to extend in some cases in a less degree for at least 3 months. Underfeeding of the animal after parturition seems to be a necessary condition to bring about this abnormal percentage of fat in the milk.

Tests of dairy cows made for short intervals in the beginning of the lactation period can not be depended upon to indicate the normal percentage of fat produced by the cows tested."

Age as a factor in milk production, F. L. KENN (*Oreg. Countryman, 4 (1912), No. 9, pp. 18-20*).—Data are presented showing that the average yield of 5 cows at the Oregon Station and 10 cows at the Missouri Station was heaviest during the fourth lactation period.

Feeding experiments with dairy cows, C. I. BRAY (*Oklahoma Sta. Rpt. 1910-11, pp. 30-36*).—On a ration of wheat bran, corn chop, alfalfa hay, and silage the cost of milk per gallon was 11.2 cts. When on a ration similar to the above, with the addition of cotton-seed meal, the cost of milk was 10.9 cts. per gallon, but the quantity was slightly decreased. In another test of the cost of milk production on a ration of bran, corn chop, cotton-seed meal, and alfalfa hay the cost was 11.7 cts. per gallon. On a similar ration, with silage as a supplement, the cost was 10.4 cts. per gallon and the yield was slightly increased.

Investigations on the effect of palm-nut cake on milk production, O. KELLNER ET AL. (*Ber. Landw. Reichsanst. Innsbr., 1911, No. 24, pp. XIII+843*).—This is the special report containing the complete details of the work previously noted (*E. S. R., 23, p. 169*).

The dairy farm from the view point of soil fertility, M. KAWASHIMA (*Oreg. Countryman, 4 (1912), No. 9, pp. 31-35*).—Data are presented to illustrate the differences in amount of fertilizing elements removed from the dairy farm when the product is sold as whole milk, cream, cheese, or butter.

The bacterial content of the normal udder, F. C. HARRISON and A. SAVAGE (*Rev. Gén. Lait, 9 (1912), No. 6, pp. 121-131*).—These experiments were undertaken to ascertain the species of bacteria which normally occur in the bovine udder, their mode of entrance, and their action and hygienic importance.

Bacteria were isolated from the foremilk, middle milk, and strippings of heifers and mature cows. The bacterial content appeared to be small, and aside from the foremilk appeared to be practically limited to a few species of white and yellow cocci. *Micrococcus albidus* and *M. varians* were predominant in both virgin and mature udders.

The following conclusions are drawn: "Aside from the teat and cistern the flora of the normal udder is a small one and consists of a few species of cocci. The flora of the teat and cistern is subject to change which may be either practically continuous or slow. All organisms found in the lower part of the udder are unable to penetrate the upper and secreting regions. The flora of the fore-milk is not necessarily any indication as to what germs are located within the gland. All bacteria with which the teat openings come in daily contact are unable to effect an entrance. The lactic-acid bacillus is occasionally present in normal udders. The cocci that characterize the middle milk and strippings come from an internal source."

Bacteria in milk. L. A. ROGERS (*U. S. Dept. Agr., Farmers' Bul. 480, pp. 28, figs. 5*).—A revision of Farmers' Bulletin 348, previously noted (*E. S. R., 20, p. 977*).

The bacterium of contagious abortion of cattle demonstrated to occur in milk, A. D. MELVIN (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 198, pp. 3*).—The undescribed pathogenic bacterium found in milk, referred to in an article previously noted (*E. S. R., 26, p. 87*), has been found by means of the complement fixation test to be identical with the organism causing contagious abortion in cattle. Although not yet known to produce ill effects in man, the discovery furnishes an additional reason for pasteurizing milk. See also a note by Smith and Fabynn (*E. S. R., 26, p. 586*).

Experiments on the demarcation of *Streptococcus acidilactici* from *S. pyogenes* and *S. lanceolatus*, Y. SAITO (*Arch. Hyg., 75 (1912), No. 3, pp. 121-133*).—Cocci grown on different media indicated that *S. acidilactici* is so closely related to *S. lanceolatus* that it might be considered as the nonvirulent type of that species. On the other hand, there are a number of characters which distinguish it from *S. pyogenes*.

A bacteriological study of the milk supply of Washington, D. C., J. J. KINTOUN and L. V. DIETER (*Amer. Jour. Pub. Health, 2 (1912), No. 4, pp. 262-274, figs. 2*).—Thirty-five per cent of the raw milk and cream samples examined had a bacterial content under 500,000 per cubic centimeter, 20 per cent between 500,000 and 1,000,000, and 45 per cent over 1,000,000.

It is stated that the colon and streptococci content of milk can be taken with reasonable certainty as a measure of the dirt content and that the chief cause of the poor quality of milk lies in the careless handling of the milk before it leaves its place of origin. Although milk examined in October and November, 1910, showed a great number of bacteria, the colon bacilli and streptococci being present in large numbers in over 40 per cent of the samples, yet the average daily temperature was not high. Many of the samples of "commercially pasteurized" milk contained large numbers of bacteria.

"It is impossible to reconcile the fact that a so-called pasteurized milk containing as many as 38,000,000 bacteria per cubic centimeter, and 210,000 of these colon bacilli and 100,000 streptococci, is anything more than a dirty, bad milk."

Report of the commission on milk standards appointed by the New York milk committee (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27 (1912), No. 19, pp. 673-691*).—This contains data on chemical and bacteriological standards for milk and cream, methods of reporting bacteria and dirt content, municipal ordinances relating to the sale of milk and cream, and other matters pertaining to the improvement and regulation of the city milk supply.

Directions for the home pasteurization of milk, L. A. ROGERS (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 197, pp. 3, fig. 1*).—A revision of Circular 152, previously noted (*E. S. R., 22, p. 179*).

The resorption of lime in the animal body by the employment of pasteurized and sterilized milk, J. ZIMMER (*Ueber Kalkresorption im Tierkörper bei Verwendung von pasteurisierter und sterilisierter Milch. Inaug. Diss., Univ. Strassburg, 1911, pp. 12*).—In experiments with dogs, pasteurizing or sterilizing milk did not affect the percentage of calcium resorbed.

[Regulations concerning the use of preservatives in milk and cream], T. REXCE (*Hoard's Dairyman*, 43 (1912), No. 16, pp. 631, 632).—This gives the regulations drafted by the British Local Government Board which will be enforced after June 1, 1912, and which prohibit the use of preservatives in milk and cream.

The sterilization of milk bottles with calcium hypochlorite, H. A. WHITTAKER and B. M. MOHLER (*Amer. Jour. Pub. Health*, 2 (1912), No. 4, pp. 282-287).—The bacterial count of bottles before treatment showed a wide range in the number of organisms. Counts on the total number of bottles examined from 8 sources showed a minimum count of 30, a maximum count of 1,600,000, and an average count of 120,000 per bottle. The counts on these same bottles after treatment with calcium hypochlorite showed a minimum count of 0, a maximum of 540, and an average of 45 per bottle. During the investigation the amount of hypochlorite required to produce efficient results was reduced from 20 to 10 parts of available chlorine per million, and the time of exposure from 1 hour to 20 minutes.

"The sterilizing of milk bottles by submerging in a solution of calcium hypochlorite appears to be a quick and inexpensive method of materially reducing the organisms present. It is not the intention of the writers to recommend this as a substitute for thorough steam sterilization but simply to be used as an expedient when the other method is impracticable."

Effects of alkali water on dairy products, C. LARSEN, W. WHITE, and D. E. BAILEY (*South Dakota Sta. Bul. 132, pp. 229-254*).—This experiment was undertaken to obtain data on the effect of water containing a large amount of mineral substances on milk and milk products.

Analyses are given of the mineral constituents in the water from 14 different wells. The water used in these experiments had a distinct saline, acid, and sharp taste, but as far as could be determined it did not have any undesirable flavors due to decayed organic matter. It contained the highest percentage of total minerals, and also the greatest quantity of sulphates of any of the waters tested.

Although the experimental cows received 0.5 lb. more soluble minerals per day than the control animals, the percentage of total ash in the milk was not affected. The ash varied in composition, the sulphates and potash being the 2 chief ash constituents which showed an increase upon feeding alkali water, but this was not sufficient to affect the normal properties of the milk and milk products.

It is concluded that alkali water free from decayed organic matter and foreign odors does not taint the milk or butter. It is thought that the complaints made by some dairy farmers concerning the undesirable effect of alkali water on the flavor and properties of milk must be accounted for in some other way, probably by the decayed organic matter which is common in alkali water. As such water dissolves more organic matter than ordinary well water. This is especially true if the water contains much sodium carbonate, or what is commonly called "black alkali."

The coagulability of milk with rennet was not affected by the alkali water, but coagulability was found to bear a relation to the percentage of calcium in the milk and the individuality of the cow. The milk low in calcium required the

most rennet for curdling and produced the softest coagulum, and this milk was produced by cows well advanced in the gestation period.

The quality of salted butter washed in alkali water was unimpaired, but unsalted butter washed in alkali water was scored about 1 point lower in quality than butter washed in normal wash water. Although the alkali wash water contained a large number of nonacid types of bacteria, they were almost entirely supplanted by a large number of acid forms in the butter shortly after its manufacture. Acid tests confirmed the results of the judges who scored the butter that alkali water free from organic matter does not affect the quality of butter. Although there were more organisms in alkali water than in the soft water they decreased rapidly as the butter aged, and were no more deleterious to the quality of the butter than those found in ordinary well water.

Chemical analyses of cheese when 1 month old showed no differences from that made with ordinary soft water. Brine-soluble protein was low and insoluble protein high in freshly made cheese from milk produced by the cows receiving alkali water, but this difference diminished after the cheese had been cured 1 month.

The "coming of age" of the Babcock test, H. L. RUSSELL (*Wisconsin Sta. Circ. Inform. 32, pp. 3-18, figs. 7*).—A brief historical sketch of dairying in the United States since 1851, with special reference to the influence of the discovery of the Babcock test in putting the industry upon a more scientific basis.

On the composition of butter fat in butter of Danish and Russian Siberian origin, G. JØRGENSEN (*Tidsskr. Landøkonomi, 1911, No. 9, pp. 603-614*).—A summary of results of the examination of 11,000 samples of Danish butter and 2,374 samples of Siberian butter, made at Copenhagen from 1896 to 1910.

The index of refraction at 40° C. for the Danish butters ranged from 1.4525 to 1.4560, with an average of 1.4545. For the Siberian butter the range was 1.452 to 1.4574, and the average 1.4545. The amount of normal alkali required to neutralize 100 gm. of volatile fatty acid ranged from 47 to 71.9 cc., with an average of 59, in the Danish butter, and from 41 to 69.9 cc., with an average of 54 in Siberian butter. A high refraction number was invariably accompanied by a low figure for volatile acids and vice versa.

Department of dairy husbandry, R. C. POTTS (*Oklahoma Sta. Rpts. 1910-11, pp. 36-44*).—A financial statement of the operations of the college creamery for the fiscal year ended June 30, 1910, is reported. The number of patrons was 466, the average percentage of cream 35, average price paid per pound for milk fat 25.16 cts., pounds of butter made 242,466, percentage of overrun 18.64, average price received per pound for butter 26.928 cts., average cost of manufacturing a pound of butter 4.255 cts.

For the year ended June 30, 1911, the figures were as follows: Number of patrons 405, percentage of cream 33, price paid for milk fat 23.603 cts., pounds of butter made 160,105, percentage of overrun 16.7, average price received per pound for butter 24.5 cts., cost of manufacturing 1 lb. of butter 5.08 cts.

The dairy conditions on 100 farms were investigated, and total cash returns of 33 are presented in tabular form. In 7 of the herds the average net loss from 87 cows was \$2.58 per cow per year, while in 8 herds the average net profit from 72 cows was \$21.32 per cow.

Better butter for Kansas (*Kansas Sta. Circ. 24, pp. 4, figs. 8*).—This contains suggestions for keeping dirt and bacteria out of milk and cream.

Experiments with pure cultures for making Parmesan cheese, C. BESANA (*Bul. Agr. [Milan], 46, (1912), No. 7, p. 1; Molk. Ztg. [Hildesheim], 26 (1912), No. 31, pp. 555, 556*).—A report of a successful attempt in using pure cultures

for Parmesan cheese. Favorable results were obtained by placing the cheese mass in a specially constructed oven, and holding it there in a moist atmosphere at a temperature of from 40 to 45° C. for from 12 to 24 hours.

Studies on the bacterial flora of cheese, C. GORINI (*Ztschr. Gärungsphysiol.*, 1 (1912), No. 1, pp. 49-59, fig. 1).—This has been previously noted from another source (E. S. R., 25, p. 582).

Factory arrangement, F. BALLANTYNE ET AL. (*N. Y. Produce Rev. and Amer. Cream.*, 33 (1912), No. 26, pp. 1106-1108, fig. 1).—This contains a number of plans for arranging machinery and cooling facilities in creameries.

VETERINARY MEDICINE.

A text-book of ophthalmology for veterinarians, H. MÖLLER (*Lehrbuch der Augenheilkunde für Tierärzte. Stuttgart, 1910, 4. rev. and enl. ed.*, pp. VIII+468, pls. 2, figs. 80).—This is a fourth revised and enlarged edition.

Diagnostic methods, R. W. WEBSTER (*Philadelphia, 1912, 2. ed., rev. and enl.*, pp. XXXV+682, pls. 57, figs. 164).—This is the second edition of this well-known work, which deals with chemical, bacteriological, and microscopical methods. The new material includes the antiformin method for tubercle bacilli; the Much method for staining tubercle bacilli; the Neubauer and Fischer test for gastric carcinoma; the Gross method for trypsin; Folin's newer methods for urinary sulphur compounds; the formalin method for ammonia in urine; Benedict's and Bang's tests for glucose in urine; the phenolsulphophthalein test for functional activity of the kidneys; the Wright and Kinnicut method of counting the blood plates; sulphemoglobinemia; and the tuberculin and iuettin reactions. The sections dealing with bacteriology of the blood and with serum pathology have been greatly enlarged.

A study of Ascoli's reaction (thermoprecipitin) for the diagnosis of anthrax, P. SILVA* (*Rev. Gén. Méd. Vét.*, 19 (1912), No. 225, pp. 503-505).—This reaction can be employed for detecting sausage and other meat products prepared from animals affected with anthrax.

The use of Ascoli's diagnostic method in practice, K. PRESSLER (*Berlin, Tierärztl. Wchnschr.*, 28 (1912), No. 11, pp. 192, 193).—This is a report on an authentic case of anthrax in which Ascoli's method gave negative results, due to the low titer of the serum employed. The author considers the method a good one, but points out that the serum employed should always be tested with filtered (hlsque) blood obtained from animals having anthrax. Other improvements are also suggested.

Dourine, its pathogenicity, and a practical test of its efficacy of drug treatment, with especial reference to the action of atoxyl and arsenophenylglycin, A. WATSON (*Jour. Compar. Path. and Ther.*, 25 (1912), No. 1, pp. 39-45).—This is a reprint from the report previously noted (E. S. R., 26, p. 881).

Is foot-and-mouth disease disseminated by milk-collecting stations? (*Molk. Ztg. [Hildesheim]*, 25 (1911), No. 52, pp. 981, 982).—It is not believed that milk-collecting stations have any great part in the dissemination of the virus.

Recent methods for the diagnosis of glanders, F. B. HADLEY (*Amer. Vet. Rev.*, 41 (1912), No. 2, pp. 152-157).—For ordinary clinical use the agglutination test was found to be the most desirable, particularly for cases of recent infection. In this work the greatest number of horses examined gave a reaction with the 1:200 dilution, others with the 1:500 dilution, and only two with the 1:800 dilution. It is pointed out that variations in the agglutinating power of the blood may occur within narrow limits in the healthy horse, but if these variations are very marked the animal must be considered with suspicion. All the

horses tested which gave a reaction in the 1:1,000 dilution were proved to be glandered by other tests. Animals reacting in such high dilution are diseased and should be immediately quarantined or destroyed. Satisfactory results could not be obtained with the Konev method (E. S. R., 24, p. 184).

Glanders and combating glanders in Kurland, L. GEBONIMUS (*Arch. Vet. Nauk [St. Petersburg]*, 41 (1911), No. 12, pp. 1542-1565; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 5 (1912), No. 5, p. 1003).—In 1910 the government of Kurland had 172 cases of glanders at 49 locations. Of these animals 163 were killed and 4 died. Comparative tests made for the purpose of determining the value of anaphylaxis tests show that the subcutaneous mallein test and the conjunctival test gave approximately parallel results.

In regard to the phagocytic action of various sera upon some of the bacteria occurring in hemorrhagic septicemia, R. BROLL and ST. ANGELOFF (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, 4 (1908), No. 5-6, pp. 469-475; *abs. in Berlin. Tierärztl. Wchnschr.*, 27 (1911), No. 34, p. 612).—The opsonic power of various sera was tested against swine plague, fowl cholera, game and bovine plague, and septic calf pneumonia bacteria.

It was noted as a result of the tests that the polyvalent swine plague serum possesses an opsonic power but not a bacteriolytic or bactericidal power. The swine plague bacterium (*Bacterium suisepeticus*) is also influenced opsonically to a slight degree by normal horse, bovine, and hog sera. The polyvalent swine plague serum, on the other hand, has a strong opsonic power which is still present in a dilution of 1:50. In addition to the *B. suisepeticus*, the fowl cholera bacterium was affected by the swine plague serum, although to a lesser extent. The opsonic action of the polyvalent serum upon the game and bovine plague bacterium was found to be very weak, whereas the calf pneumonia serum behaved as would a normal serum.

It was further noted that the opsonins were heat labile. Heating the polyvalent serum for $\frac{1}{2}$ hour at 60° C. (inactivated) was sufficient to cause a considerable reduction in the opsonic power.

An extensive epizootic of rabies, A. CARINI (*Ann. Inst. Pasteur*, 25 (1911), No. 11, pp. 843-846; *abs. in Jour. Amer. Med. Assoc.*, 58 (1912), No. 2, p. 149).—The author reports an extensive epizootic of rabies in cattle and horses in Brazil, which caused the death of some 4,000 cattle and 1,000 horses.

"There was no unusual prevalence of rabies in dogs at the time, but it was noticed that bats in broad daylight attacked and bit the cattle, and the author suggests that bats may have been the source of the extensive epizootic. It has been prevailing for several years but exclusively in a narrow strip of the country. As its true nature was not discovered until recently, prophylaxis has not been on the correct basis. The animals affected all die after a few days, and the meat and hides have been utilized but no mishaps have been known to follow."

Studies in regard to tuberculosis, A. FONTES (*Mem. Inst. Oswaldo Cruz*, 3 (1911), No. 2, pp. 196-217, pls. 7).—Thinking that some of the results obtained in previous work (E. S. R., 25, p. 184) might be due to the presence of enzymes such as zymase, protease, and oxidase, the author made tests with filtrates which contained the granula obtained from the cultures of tubercle bacilli.

Although negative results were obtained in the enzym tests, a substance capable of dissolving or saponifying fats was noted in the juice obtained from caseated and ruptured lymphatic glands. The granular forms of the tubercle bacillus were produced by injecting extracts from the diseased lymphatic glands and the human type of bacillus into the abdominal cavity of guinea pigs. Granula were noted in the lymphatic glands of the experimental animals,

but in no instance was the regular acid-fast tubercle bacillus detected. Most of the experimental animals had a generalized tuberculosis. The extracts of caseated foci contained a specific substance which was antagonistic to the tubercle bacillus, and which according to the author does not originate from the bacillus. The use of iodine preparations in tuberculosis increased the process of congestion.

Tuberculosis (Illinois Sta. Circ. 153, pp. 3-21, figs. 13).—This is a republication of the compilation previously noted (E. S. R., 26, p. 373).

In regard to the chemical composition of the tubercle bacillus, T. PANZER (*Hoppe-Seyler's Zeitschr. Physiol. Chem.*, 78 (1912), No. 5, pp. 414-419).—The author points out that the published analyses of the tubercle bacillus do not give any clue in regard to the principal constituents of this organism.

Tubercle bacilli which were cultivated on glycerin bouillon were killed by heat, collected on a filter, washed with water, and dried in a vacuum over calcium chloride. The weight of dried bacilli obtained was 2.7 gm. They were then rubbed up and extracted successively with ether, alcohol, cold water, 1/20-normal hydrochloric acid, 1/20-normal sodium carbonate, 1/20-normal sodium hydrate, hot water, and 2 per cent potassium hydrate.

The cold water, hydrochloric acid, sodium carbonate, sodium hydrate, and potassium hydrate extracted very little material. The unsaponifiable material contained in the ether extract of the bacilli, precipitated with digitonin and extracted with petroleum ether and xylol, yielded a mixture of colorless crystals and a yellow, smeary mass which did not give the cholesterol reaction. According to the author two higher alcohols are probably present. The alcoholic solution obtained reduced Fehling's solution and on evaporation yielded a brown, partly crystalline residue.

The hot water extract of the bacilli on evaporation left a residue which resembled one of gum arabic. This substance was free from sulphur, nitrogen, and phosphorus, gave Molisch's reaction with α -naphthol, was precipitated from the aqueous solution with alcohol or lead acetate, and after boiling for a time with hydrochloric acid reduced Fehling's solution. On oxidizing with nitric acid no mucic acid was produced, the chief product being oxalic acid. In addition a crystalline substance resembling calcium saccharate was also obtained. This substance is probably pectin.

The residue remaining after extraction of the above reagents and containing nitrogen gave Molisch's reaction, and after boiling with hydrochloric acid reduced Fehling's solution. The filtrate obtained from treating another portion of the residue with pepsin did not give a biuret reaction, although the solid particles remaining did. This resistant body is evidently chitin.

Tuberculosis of the abomasus of bovines, P. CHAUSSÉ (Bul. Soc. Cent. Méd. Vét., 83 (1911), No. 20, pp. 452-476, figs. 12).—A discussion in regard to the macroscopical and microscopical findings and the pathology of this condition. The article contains profuse illustrations of pathological preparations.

The ophthalmic test for bovine tuberculosis, A. WILSON (Jour. Compar. Path. and Ther., 24 (1911), Nos. 1, pp. 53-66; 2, pp. 116-126).—This is a critical study of the ophthalmic and subcutaneous tests for detecting tuberculosis. Considerable stress is laid upon the unreliability of diagnosing tuberculosis on the basis of the simple ophthalmic test alone. Satisfactory results can only be obtained when both tests are conducted together.

Utilizing the work of our international commission on the control of bovine tuberculosis, M. H. REYNOLDS (Amer. Vet. Rev., 41 (1912), No. 2, pp. 196-200).—In this paper the author points out the services rendered by agricultural colleges, farmers' institutes, state live-stock sanitary boards, etc., in combating tuberculosis.

In regard to the type of tubercle bacilli which is present in tuberculosis of swine, H. E. KROSTEN and E. UNGERMANN (*Tuberkulose Arb. K. Gesundheitsamt*, 1912, No. 17, pp. 171-199).—From 19 tuberculous swine pure cultures of the bovine type of bacillus were obtained and tested as regards virulence with guinea pigs. Seventeen of the cases were taken at random in the slaughterhouses while the 2 remaining ones were suspected of being of human origin. One of the latter cases on autopsy seemed to have its inception as a result of castration.

Infectious abortion in bovines, MIESSNER (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 18, pp. 316, 317).—After investigating the value of the sero-diagnostic methods with cattle in the eastern provinces of Germany, the author finds that the agglutination and complement fixation methods, in the form in which they have been used for diagnosing glanders, are a reliable means for diagnosing infectious abortion in bovines. In practically all cases the serum test substantiated the clinical findings. Infectious abortion was found to have no relation to vaginal catarrh. The author will publish a more detailed report of this work later.

A comparative investigation in regard to milk from cows having infections of the udder, E. SEEL (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 21 (1911), No. 5, pp. 129-168; *abs. in Ztschr. Angew. Chem.*, 24 (1911), No. 12, p. 561).—From the results it could be noted that the reaction of the secretion from animals suffering from mastitis is alkaline toward litmus. The milk sugar, fat, and chlorids are much diminished, while the protein, particularly albumin, is increased. The refraction of fats showed considerable variation from the normal.

Abnormal milk from cows affected with an inflammation of the mammary glands, C. AMBERGER (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 3, pp. 369-379).—A description of the chemical changes taking place in the milk from 2 animals during the cycle of the disease. The most pronounced changes were the same as those noted in the abstract above with the exception that the chlorin content was increased. One of the samples showed at the outset an increased fat content.

Investigation of milk from cows suffering from mastitis for its enzyme content, H. ULMANN (*Untersuchungen von Milch euterkranker Kühe auf ihren Enzymgehalt. Inaug. Diss., Tierärztl. Hochschule Stuttgart, 1912, pp. 78; rev. in Deut. Schlacht u. Viehhof Ztg.*, 12 (1912), No. 21, pp. 319, 320).—The enzyme content of milk was found to be influenced by the presence of mastitis, which in most instances had a tendency to increase it. It, however, undergoes marked fluctuations and is greatly dependent upon the nature of the changes which have taken place in the secretion. The catalase content is almost always increased in both the mixed milk and the milk obtained from the inflamed quarter. Such milk is usually alkaline. The reductase reaction (Schardinger's enzyme) in the first stages of mastitis is present in either a normal or an increased amount, so it is, therefore, without value for detecting mastitic animals. Oxidase, peroxidase, and diastase tests are also of no value for this purpose.

Contagious vaginitis in cows, P. STAZZI (*Vet. Jour.*, 68 (1912), No. 440, pp. 83-88).—The following measures are recommended by the author, who was commissioned by the Italian minister of the interior to investigate and report on this disease, which is of great importance in Italy as well as elsewhere.

"Provide open pasturage for all cows, especially for those whose conception is tardy. Wash frequently the flanks, tails, and feet of cattle with soap and soda. Cleanse and disinfect weekly with boiling soap suds or lime wash all stalls, harness, etc. Disinfect the genital organs of bulls before and after

colitis (2 per cent solution of Iryoform recommended). Treat heifers till cured according to veterinary advice, suspending the treatment during oestrus. Douche with 2 per cent solution of carbonate of soda during oestrus, especially immediately before covering. After the seventh month of pregnancy use only the mildest of medicaments, such as ointments containing a very little belladonna and only 0.5 per cent of a nonirritant antiseptic, Iryoform, etc. Isolate or slaughter cows suffering from chronic metritis and those in whom oestrus has entirely ceased. After parturition inject weak solutions of iodine—a teaspoonful in each quart of tepid water."

The treatment of contagious vaginitis in cattle, E. WALTER and A. GÄRTNER (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 8, pp. 133-140; *obs. in Jour. Comp. par. Path. and Ther.*, 25 (1912), No. 1, pp. 74-82).—In attempting to discover a disinfectant which might be kept in constant contact with the mucous membrane and one which is at the same time simple of application, the authors have made successful use of a eucerin salve. In preparing this ointment the anhydric eucerin is gradually worked up in a mortar with the desired quantity of a watery solution of the medicament until the mixture is quite uniform. The complete absorption of the water is indicated by the clinging of the mixture to the sides of the mortar.

In the experiments here reported eucerin ointments containing 10 per cent bacillol, 0.5 per cent sublinin, and 25 per cent water; 10 per cent sapoformol, 0.5 per cent sublinin, and 25 per cent water; 8 per cent bacillol, 0.6 per cent sublinin, and 25 per cent water; 3.5 per cent copper sulphate and 25 per cent water; 10 per cent copper sulphate and 25 per cent water; 10 per cent copper citrate and 25 per cent water; 8 per cent bacillol, 0.6 per cent sublinin, and 25 per cent water; 8 per cent bacillol, 0.5 per cent sublinin, and 25 per cent water; and 8 per cent bacillol and 25 per cent water, respectively, were employed.

From the results obtained it may be concluded that animals affected with vaginitis can be cured in this way. "The results are the same whether the cases are recent or of long standing, and also if other methods of treatment have been tried. This result is obtained by the application of a disinfectant which is present in the same proportion in a number of other materials that are in common use for the treatment of this disease. Since these preparations are by no means so successful, the authors concluded that the difference must lie in the vehicle in which the disinfectant was suspended. . . .

"It is absolutely necessary that the eucerin mixture be applied to the whole of the diseased membrane. . . . Relapses ceased to occur when the salve was distributed throughout the vagina by means of a special instrument—cannulifactor. The even and thorough distribution of the salve over the mucous membrane by means of this instrument was controlled by the examination of 3 animals that were slaughtered. Ten gm. of the mixture were smeared over the walls of the vagina by its means shortly before death, and after slaughter it was found that the entire mucous membrane was covered with a layer about 1 mm. thick. In practically all the experimental animals application of the bacillol mixture caused the disappearance of the nodules within 4 to 5 days, and it was only in quite exceptional cases that traces of the lesions were visible on the fifth day. In cases where the treatment was continued for longer periods it was done with the idea of preventing relapses with greater certainty and not to improve the local curative effect. The treatment was quite simple and was not followed by any untoward symptoms, such as restlessness and straining. The nature of the treatment with the soft, semifluid salve is such that animals in the last stages of pregnancy may be submitted to it without hesitation. . . .

since no immunity is conferred by this method of treatment steps must be taken by resorting to disinfection, to prevent the persistence of the cause of the disease on the bodies of the animals and in the stalls. For this reason disinfection was practiced in the later experiments; the hindquarters of the animals were washed with either 5 per cent bacillol or 5 per cent sapoformol, and the stalls were subjected to a thorough cleansing, followed by a disinfection with lime wash. In order to prevent the introduction of fresh infection through the agency of the hull, this animal was also subjected to treatment. About 10 gm. of eucerin mixture were introduced into the sheath and distributed by massage. As in the case of cows this treatment was carried out on 10 occasions, 5 on consecutive days and 5 on every second day.

Nodular intestinal disease of cattle, W. JOWETT (*Jour. Compar. Path. and Ther.*, 25 (1912), No. 1, pp. 15-22, figs. 5).—The author thinks the species *Cryptogastromus biramosus* the cause of the nodular disease of cattle in the Cape Peninsula, South Africa. See also a previous note (E. S. R., 26, p. 382).

A contribution to the illustration of the injury caused by the ox warble and the manner of combating it, H. J. DE VRIES (*Ein Beitrag zur Illustration des durch die Dasseltiege verursachten Schadens, und die Bekämpfung derselben beim Rindvieh. Inaug. Diss., Univ. Bern, 1910, pp. 63, pls. 5*).—In the first part of this work the author briefly reviews the history of the biological study of the ox warble (*Hypoderma bovis*). Observations of the larva in the esophagus, vertebral canal, and subcutis are then reported. Discussions of the effect of the wandering of the larvæ upon the tissues, the amount of injury caused as based upon the decrease in milk, flesh, and value of the hide, and methods of combating it, especially as applied to the Netherlands, follow.

Several plates are included which illustrate the life history of the insect in its various stages, injury caused to the hide, etc.

A campaign against the ox warble, V. DEBOUIN (*Rev. Gén. Méd. Vét.*, 19 (1912), No. 226, pp. 557-571, pls. 2, figs. 3).—A summarized account of the ox warble, its economic importance, biology, prophylaxis, etc.

Bacillus enteritidis Gärtner in the carcasses of eight calves, H. WINZER (*Zeich. Fleisch u. Milchhyg.*, 22 (1911), No. 3, pp. 81-84; abs. in *Jour. Compar. Path. and Ther.*, 25 (1912), No. 1, pp. 57-59).—"The author's experience in connection with the occurrence of organisms of this group in meat is at variance with the scanty published references, in that within 4 months he has been able to isolate from the carcasses of 8 calves organisms which on morphological, cultural, and serological grounds undoubtedly belong to the Gärtner group."

Melanosis in calves, A. JAEGER (*Berlin. Tierärztl. Wchnschr.*, 27 (1911), No. 44, pp. 793-798).—A contribution in regard to the relation of melanosis to cancer.

On the treatment of contagious pneumonia (Brustseuche) of the horse with Salvarsan, NEVERMANN (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 7, pp. 119-125; abs. in *Jour. Compar. Path. and Ther.*, 25 (1912), No. 1, pp. 63, 64).—"Sixty-five stallions were treated with Salvarsan, and of these 55 were free from fever within 5 days, at the longest, after a single injection of 3 gm. The other 10 animals received a second dose of 2 gm. on the fifth day of the disease, and the temperature of these was normal on the eighth day from the onset of symptoms. No untoward symptoms followed the injection of Salvarsan, and it was very striking how quickly the animals treated with the drug recovered."

Agglutination reactions during the process of hog cholera serum production, W. GUNTER (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 60 (1911), No. 6, pp.

552-579; obs. in *Ztschr. Immunitätsf. u. Expt. Ther.*, *H. Ref.*, 5 (1911), No. 4, pp. 361, 362).—Previously noted from another source (*E. S. R.*, 23, p. 736).

In regard to immunizing against hog cholera and swine plague, H. PUNZ (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, 11 (1912), No. 2, pp. 123-132; obs. in *Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 17, p. 2397).—After making an examination of a number of cases of swine plague in young pigs the author concludes that the work of Löffler and Schütz does not determine the etiology of this disease. For combating it, he recommends extreme hygienic measures, protective vaccination occupying only a secondary place.

The etiology of hog cholera seems to have been worked out. In this disease protective vaccination is of great importance. The protective and curative action is the best when a composite serum is employed.

Combating swine plague by vaccinating pregnant hogs, F. TRAIN (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 3, pp. 45, 46).—By vaccinating 17 pregnant hogs in infected stalls with polyvalent swine plague bacillary extracts, pigs were obtained free from the disease and went on so to maturity. Antiseptin was used for 23 other animals. Of these 22 gave birth to sound litters and 3 others yielded pigs with exanthema, but without a cough. Three additional animals which received antiseptin and antiserum simultaneously yielded sound offspring.

The results obtained by other workers with these preparations are included.

On the chemistry and toxicology of ascarids, F. FLURY (*Arch. Expt. Path. u. Pharmacol.*, 67 (1912), No. 4-5, pp. 275-332).—The first part of this work (pp. 275-338) deals with the chemistry, the second part (pp. 339-392), with the toxicology of ascarids.

RURAL ENGINEERING.

Fundamental principles in tile drainage, J. L. PARSONS (*Proc. Iowa Engin. Soc.*, 23 (1911), pp. 30-38).—This is a paper read before the Iowa Engineering Society, held at Des Moines, February 15-17, 1911.

The essential features in planning a tile drainage system are pointed out and discussed, among them the planning of grade lines, determining the sizes of tile, and laying out and spacing laterals.

The reclamation of Missouri lowlands for agricultural purposes, F. F. SHAFER (*Colman's Rural World*, 65 (1912), Nos. 17, p. 1; 18, p. 1; 19, p. 1).—The author briefly discusses some of the principal factors that should guide an engineer in making plans for drainage improvement districts, among which are climate, rainfall, topography, watershed, vegetation, and soil characteristics, and describes tile drainage and its benefits.

Results of experiments made to determine the waste of water by cultivators in irrigating their fields during the 3 years 1907-10, W. B. GORDON (*Punjab Irrig. Branch Papers*, No. 11, pt. 2 B, pp. 5).—The results of these experiments show that the average cultivator in the Punjab in applying the water to his fields wastes on an average at least 20 per cent of it. Dividing the fields into compartments and insisting upon the water being delivered separately into each compartment are advocated.

[Problems relative to irrigation of fields], J. M. PUJADOR (*Rev. Inst. Agr. Catalán San Isidro*, 61 (1912), No. 7, pp. 99-102, figs. 3).—Systems of field irrigation are described, consisting essentially of motor-driven pressure pumps, pipe or hose systems for conveying the water, and apparatus for sprinkling and distributing the water over the fields.

A kerosene motor for irrigation, R. OLNEY (*Irrig. Age*, 27 (1912), No. 6, p. 218, fig. 2).—Attention is called to the use of kerosene motors for driving

irrigation pumps and a table of test results is given showing the total cost of fuel per brake horsepower, for a season of 80 days, of steam and gasoline as compared to kerosene. Data derived from the operation of 3 types of steam engines, 1 type of gasoline engine, and 1 type of kerosene engine, ranging from 30 to 100 horsepower, show that the cost of fuel for the kerosene engines was approximately one-half that for the gasoline engines, and approximately two-thirds that for the steam engines.

Irrigation laws of the State of Nebraska in force July 7, 1911, D. D. PRICE (*Lincoln, Nebr.: Bd. Irrig., Highways, and Drainage, 1911, pp. 72*).—A compilation.

Triennial revenue report of the public works department, irrigation branch, Bengal, for the 3 years ending 1910-11, T. BUTLER (*Trien. Rev. Rpt. Pub. Works Dept., Irrig. Branch, Bengal, 1910-11, pp. 111+103, pls. 16*).—This report gives tabulated statements showing the areas irrigated, the capital outlay, and financial results of the canals in Bengal, diagrams illustrating the canals and tables of rainfall data, water duty data, crop experiments, and values.

Fifteenth biennial report of the state engineer of Colorado, C. W. COMSTOCK (*Bienn. Rpt. State Engin. Colo., 15 (1909-10), pp. 341, pls. 14*).—This report covers the existing physical and financial status of water supply and irrigation, road, and bridge works in Colorado in 1909-10, and includes the reports of division irrigation engineers, tabulated data from the reports of water commissioners, and a preliminary hydrographic report of the Yampa Basin. A large amount of tabulated discharge data from hydrographic investigations of the principal rivers of the State is presented.

First biennial report of the State Road Commission of Utah, 1909-10 (*Bienn. Rpt. State Road Com. Utah, 1 (1909-10), pp. 70, pls. 21, figs. 4*).—This report, embodying reports of the 4 state road commissioners, states the progress of road improvement and construction in Utah in 1909-10, discusses the methods in use, gives a detailed account of the cost in each county, and makes recommendations for modifying the road statutes of the State relative to methods of improvement, construction, and administration.

The combined reports of all counties show that during 1909-10, 125,424 miles of road have been graded, surfaced with gravel or stone, or reconstructed of sand and clay at a total cost of \$100,631.

Preliminary report on the road materials and road conditions of Oklahoma, L. C. SNIDER (*Okla. Geol. Survey Bul. 8, 1911, pp. XIII+191, pls. 12, figs. 26*).—This bulletin describes the meteorology, geography, and rock formations of Oklahoma, the general conditions and road laws, the distribution of road materials throughout the State, and the physical and chemical properties of road materials, and discusses the financial and social advantages of good roads in the different localities.

The construction and maintenance of earth and sand-clay roads are discussed under the subheads of location, surface and underdrainage, bridges and culverts, and machinery used. Paved roads are discussed under the subheads of macadam, brick, stone-block, and bitumens. The distribution of road materials is given by counties, and their distribution and the road conditions are discussed by dividing the State into 3 districts, the eastern district, the western district, and the southern or cretaceous district. The road materials of the State are classified in general as sand, clay, gravel, bitumens, coal-mine clinkers, igneous, sedimentary, and metamorphic rocks.

Use of bitumens for roads, A. H. BLANCHARD (*Municipal Jour., 32 (1912), No. 20, pp. 750-753*).—This is a paper read before the American Association for the Advancement of Science. A review is given of the use of bituminous mate-

rials in the construction and maintenance of American highways, giving an discussing the extent of use, surface treatment, the penetration method, and bituminous concrete.

Construction of country roads (*Missouri Bd. Agr. Mo. Bul.*, 10 (1912), No. 78, figs. 55).—This bulletin discusses road contracts, costs of plans, survey, etc., the construction and cost of earth, sand, sand-clay, chert, rock and gravel bituminous, concrete, and brick roads, and the methods and cost of maintenance.

General forms for specifications and contracts, roads and culverts, 1911 (*Missouri Bd. Agr. Mo. Bul.*, 9 (1911), No. 10, pp. 38).—This pamphlet contains suggested forms and other data for specifications and contracts relating to highway work.

Electric power on the farm, A. SHANE (*Iowa State Col. Engin. Expt. Sta. Bul.*, 10 (1911), No. 1, pp. 63, figs. 36; also in *Gas Engine*, 14 (1912), No. 5, pp. 244-246, figs. 2).—It is the purpose of this bulletin to outline an electric system of general application to the farm and to discuss in some detail a particular installation under certain assumed farm conditions.

It is stated that on an average sized farm without the advantages of water power or a nearby transmission line, a gasoline engine offers the most advantages for driving the generator, chief of which are the little attention required and the fuel economy. Some electrical facts are stated, a few general instructions are given relative to installation, wiring, daily operation, ordering and testing apparatus, and computing operating costs. The general advantages of electric power on the farm are pointed out, such as flexibility in application to farm buildings, the independence of the farmer to outside help and weather conditions, and safety, easy care, easy control, and economy of electric machinery. The estimated cost of a power plant consisting of a 10-horsepower gasoline engine, 6 kilowatt generator, switchboard, and a 50-cell storage battery with accessories is \$1,017, and of the entire installation, including house, outbuilding, and outside apparatus is \$1,480.50.

Experiments on the application of electricity to agriculture (*Jour. Soc. Agr. Brabant et Hainaut*, 57 (1912), No. 18, pp. 203, 204).—Results of investigations are given showing the electric power required for driving different agricultural machines.

A review of investigations of the international congress on the application of electrical energy, P. LECLER (*Bul. Soc. Agr. France*, 1912, May 1, pp. 445-456).—The production, transmission, and utilization of electrical energy are dealt with, the bulletin discussing more especially the use of electricity in agriculture for electroculture and driving farm machinery, from both the technical and economic points of view.

A novel and efficient farm power plant, E. S. ESTEL (*Kimball's Dairy Farmer*, 10 (1912), No. 8, p. 275, figs. 2).—The author describes a farm water-power plant, consisting essentially of a small concrete pressure dam, having an 8-ft. head, a 9-ft. overshot water wheel, a small power house, transmission line, and house and outbuilding installations of motors, lights, etc. The total cost is given as a little less than \$400.

Use of dynamite on the farm (*Philadelphia*, 1911, pp. 112, figs. 58).—This pamphlet gives a large amount of data dealing with the use of dynamite on the farm, including directions for the use of this explosive in land clearing, digging drainage ditches, road grading, excavating for foundations, cellars, walls, post holes, etc., subsoiling and plowing, orchard cultivation, and for breaking up ice gorges, log jams, and log rollways.

The hydraulic ram, W. C. DAVINSON (*Missouri Bd. Agr. Mo. Bul.*, 10 (1912), No. 2, pp. 36, figs. 19).—This bulletin deals with the use of the hydraulic ram on the farm, describing the complete equipment and the theory of operation of

...stating the local conditions requisite, giving the necessary details for installing a hydraulic ram, and discussing methods for computing the capacity of a hydraulic ram and the flow of streams or springs supplying the water. In addition considerable specific information is given regarding types of hydraulic rams, special installations, and methods of installing plants to satisfy individual conditions.

A novel automobile for soil cultivation, P. ÉVERARD (*Ann. Gembloux*, 22 (1912), No. 5, pp. 309-312, figs. 2).—A motor-driven machine for soil cultivation is described, consisting of a frame supporting a motor, a pair of adjustable rollers which operates a double set of traveling plow shovels, and a pair of cutting discs in front of the shovels. The motor is connected to the other apparatus by a chain drive and can be disconnected and used for driving other farm machinery or for transportation.

New spring-shovel cultivator (*Wiener Landw. Zig.*, 62 (1912), No. 27, p. 43, figs. 2).—A cultivator is described which has spring beams for its shovels as a protection against breaking the beam by striking roots, stones, etc.

The binder engine, E. B. SAWYER (*Nebr. Farmer*, 44 (1912), No. 18, p. 503, fig. 1).—Attention is called to the use of a light weight all-purpose engine for driving the mechanism of a binder. This engine is attached to the rear of the machine with brackets and operates the whole mechanism of the binder by means of a special drive chain connection. The drive wheel of the binder can be disconnected and this results in a great saving of horses.

Land dragging in good cultivation, J. JENSEN (*Masch. Zig.*, 10 (1912), No. 32-34, fig. 1).—The need of dragging the fields during the spring ground breaking, thereby smoothing the ridges and breaking the clods, is pointed out, and a drag is described which is suitable for a road drag, land drag, or manure spreader. This drag is constructed of 2 wooden beams about 5 ft. apart connected by an iron rod framework to each of which is attached an iron hand drag blade.

Test of a grain cleaning and sorting machine, J. REZEK (*Mitt. Landw. Versuchs. K. K. Hochsch. Bodenkul. Wien*, 1 (1912), No. 1, pp. 115-129, table pl. 1, fig. 1).—This article gives a description of the operation and mechanical details of a machine for the cleaning, drying, and sorting of grain, and gives the methods and a table of results of tests. The grain is cleaned and dried by fan action and is separated into 3 different weights by the centrifugal action of a revolving drum. A mathematical discussion of the centrifugal action on the different weights of the grain is given, and with it a section of the centrifugal drum and plans showing the details and dimensions of the machinery in general.

The mechanical harvesting of cotton, F. MAIN (*Jour. Agr. Trop.*, 12 (1912), No. 129, pp. 75-78).—A machine is described for the mechanical picking of cotton, consisting of a frame set on 4 wheels, supporting a 30-horsepower engine, which drives the picking machinery and is directly connected to the main drive wheels. The cotton is picked by the action of steel teeth and fingers and is conveyed to sacks in the rear. It is claimed that from 8 to 10 acres of cotton can be picked in a day.

Report of tests on a dairy refrigerator, B. MARTINY (*Molk. Zig. Berlin*, 22 (1912), No. 16, pp. 181-183, figs. 3).—This article describes and gives the results and conclusions of tests of a device intended for the quick cooling of fresh milk and cream. This device consists of a chest containing an ice box with sloping bottom, above which is a receiving basin for the milk and cream. This communicates with a drip or sieve basin from which the milk and cream runs down along the bottom side of the sloping ice chest in a thin stream. It is quickly cooled in its descent and is caught in a reservoir below.

The results of tests lasting 3 days show the weights of ice and milk and the time required to cool given quantities of milk and cream. The advantages of the device pointed out are that it is self-acting, its capacity is such that a considerable quantity of milk and cream can be cooled and stored for some time, it is simple in construction and operation, and its initial cost and cost of operation are relatively small.

RURAL ECONOMICS.

Farms and farm property [in the United States] (*Bur. of the Census* [U. S.] *Bul. 13*, pp. 20, figs. 3).—This bulletin presents in final form the principal data pertaining to farms and farm property in the United States by States and geographic divisions for 1900 and 1910, and by geographic divisions for each census from 1850 to 1910, correcting and supplementing preliminary data (*E. S. R.*, 25, p. 893).

The following table summarizes for the United States the principal facts regarding population, farms, and farm property for the years 1910 and 1900.

Farms, farm land, and farm property of the United States.

	1910 (April 15).	1900 (June 1).	Increase.	
			Amount.	Per cent.
Population.....	91,972,266	75,994,676	15,977,590	21.0
Urban population.....	42,623,383	21,609,046	21,014,337	97.3
Rural population.....	49,348,883	44,384,930	4,963,953	11.2
Number of all farms.....	6,361,502	5,737,372	624,130	10.9
Land area of the country.....acres.	1,903,289,600	1,903,461,760	-172,160	-0.01
Land in farms.....do.....	878,793,325	838,691,774	40,101,551	4.8
Improved land in farms.....do.....	478,461,750	414,408,487	63,953,263	15.4
Average acreage per farm.....	133.1	146.2	-13.1	-9.0
Average improved acreage per farm.....	75.2	72.2	3.0	4.2
Per cent of total land area in farms.....	46.2	44.1	2.1	4.8
Per cent of land in farms improved.....	54.4	49.4	5.0	10.1
Per cent of total land area improved.....	28.1	21.8	6.3	29.2
Value of farm property, total.....	\$40,661,449,090	\$20,439,901,164	\$20,221,547,926	100.0
Land.....	28,475,674,169	13,068,007,096	15,407,667,073	118.1
Buildings.....	6,325,451,528	3,556,639,496	2,768,812,032	77.8
Implement and machinery.....	1,265,149,793	749,775,970	515,373,823	68.7
Domestic animals, poultry, and bees.....	4,925,173,610	3,075,477,703	1,849,695,907	60.1
Average value of all property per farm.....	\$6,404	\$3,563	\$2,841	80.0
Average value of all property per acre of land in farms.....	46.64	24.37	22.27	91.4
Average value of land per acre.....	32.40	15.57	16.83	108.1

Increase in value of farm lands (*Conn. Farmer*, 42 (1912), No. 16, p. 4).—This article directs attention to the constant increase of land values in New England, attributing it to the increased demand for land from people who have lived in the West and are now seeking cheaper lands nearer better markets in the East.

Making the farm renter a farm owner, G. H. CUSHING (*Nat. Land and Irrig. Jour.*, 5 (1912), No. 5, pp. 1-6, figs. 6).—It is noted in this article that the directors of the Canadian Pacific Railway Company have recently appropriated \$500,000 as an initial fund to be loaned to renters for the purpose of buying and settling lands in the Provinces of western Canada. The conditions incident to any loan are (1) that the applicant is married, (2) must have demonstrated his ability to operate a farm successfully, (3) must have enough money to pay one-tenth the purchase price of the farm and maintain his family for a year;

must personally inspect and select the land he buys. If he can meet the requirements the company will loan him as much as \$2,500 at 6 per cent interest for a period of 10 years.

The condition of the agricultural workmen in Sweden (*Internat. Inst. Agr. Econ. Bul. Bur. Econ. and Soc. Intel.*, 3 (1912), No. 2, pp. 207-222).—This article notes that during the last quarter of the eighteenth century, the peasants formed on an average 63.4 per cent of the agricultural population in Sweden; the "base tenants," that is tenant farmers whose rent consists in a fixed number of days' labor for the proprietor, 12.1 per cent; the "backstugusittare" (occupiers of the smallest lots of land who are not bound to a fixed number of days' labor for the proprietor), and the "inhysseshjon" (persons who work without contract), 8.5 per cent; and the servants 16 per cent. A century later the peasants constituted about 55 per cent of the farming population, while the "base tenants" formed 15 per cent, the "backstugusittare" and "inhysseshjon" 14.2 per cent, and the servant class, 15.8 per cent. The rural population between 1751 and 1940 averaged 80 per cent of the total population, but in 1908 it was only 49.12 per cent. The cause of the variation is attributed to manufactures and emigration.

With the decrease of farm laborers there has been a noticeable increase in their wages, which is illustrated in the following table:

Wages of the various classes of agricultural laborers.

Years.	Annual ordinary wage of servants lodged and boarded by the master.		Annual wage of laborers on "mixed wage" (partly in kind and partly in money).		Daily wage in summer.		Daily wage in winter.	
	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.
	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>	<i>Crowns.</i>
57-1875.....	154	61	375	214	1.82	0.86	1.20	0.60
181-1835.....	153	66	356	213	1.55	0.83	1.04	0.57
184-1868.....	173	84	404	225	1.78	1.02	1.34	0.71
187-1905.....	233	123	507	286	2.21	1.30	1.84	0.93
190.....	287	168	626	360	2.66	1.57	1.89	1.15

Other notes and tables are given showing phases of the social and economic conditions of the laborers.

Immigration and employment of Polish farm laborers in France (*Bul. Off. Travail [France]*, 18 (1911), Nos. 11, pp. 1071-1081; 12, pp. 1210-1219).—The continually increasing scarcity of agricultural laborers in France has given rise to the establishment of a number of agencies whose purpose is to secure such laborers from beyond the frontier and arrange for their employment. The special efforts of these organizations in France, in cooperation with the Polish societies, to attract Polish laborers have met with reasonable success. Most of the agencies arrange contracts which stipulate the wages the laborers are to receive. Men and women field laborers engaged by the year usually receive from 324 to 528 francs (\$62.53* to \$101.90), including food and lodging, and if the laborer renews his contract for a second year from 420 to 624 francs. The wages of young men and women range from 240 to 350 francs a year, according to their aptitude and age.

Report of the Irish Agricultural Organization Society, Limited, for the year ending June 30, 1911 (*Rpt. Irish Agr. Organ. Soc.*, 1911, pp. 122).—In this report it is shown that the growth of the cooperative movement among

farmers in Ireland has been steadily and satisfactorily maintained. There were 19 cooperative creamery societies formed during the year and 14 agricultural societies, making a total of 320 of the former and 168 of the latter. Cooperative credit banks increased from 234 to 237, and the total of cooperative societies from 835 to 905. Data are given showing the work of a number of individual societies. See also a previous note (E. S. R., 23, p. 195).

Crop Reporter (U. S. Dept. Agr., Bur. Statist. *Crop Reporter*, 14 (1912), No. 4, pp. 25-52, fig. 1).—This number includes notes and statistics showing the condition of winter wheat and rye; the condition of farm animals April 1, and estimated losses for a period of years and for the year ended March 31, 1912, with comparisons; farm value of crops and products on dates indicated; range of prices of agricultural products at important markets; monthly receipts and stocks of eggs and poultry in the United States, temperature and precipitation statistics, data as to high prices and crop production, apple shipments for 1911, and a diagram indicating the yearly trend of the per capita production and price of imported farm products.

It is concluded that the world's production of the staple food products has been increasing at a rate faster than the increase of population, and that "the recent advances in the 'cost of living' are not due to scarcity or lessening of agricultural products."

Agricultural statistics of Bengal for 1910-11 (*Agr. Statist. Bengal, 1910-11*, pp. 77).—Tables showing the total acreage, classification of areas, crops, and current fallows in each district of Bengal during the agricultural year ended March 31, 1911, are here presented.

AGRICULTURAL EDUCATION.

Provisions in the various Southern States for teaching agriculture, E. R. KONE (*South. Ed. Assoc., Jour. of Proc.*, 22 (1911), pp. 525-532).—This article presents data and observations as to provisions made by the federal and state governments for instruction in agriculture in the various Southern States.

It is noted that a majority of these States make special provisions for teaching agriculture either in the public schools or in special agricultural schools, as well as in the agricultural colleges. Other States have statutory provisions requiring such instruction in elementary or high schools, but make no special appropriations for it.

What constitutes successful work in agriculture in the high school, L. N. DUNCAN (*South. Ed. Assoc., Jour. of Proc.*, 22 (1911), pp. 532-536, pl. 1).—The successful teacher in agriculture is here described as one who not only acquaints his pupils with truths and principles of soil formation, soil preparation, seed selection, cultivation, plant propagation, etc., but imbues them with the spirit of the subject and creates a desire for further study. A number of practical suggestions are presented showing the best methods for teaching agriculture and obtaining these desired and more lasting results.

Training of teachers for secondary courses in agriculture, A. C. MONAHAN (*Yearbook Nat. Soc. Study Ed.*, 11 (1912), pt. 2, pp. 9-21).—In discussing the need and demand for teachers in agriculture and what is being done toward training them, it is noted that in 1910 agriculture was taught in over 100 special agricultural schools, and as a separate subject in more or less complete courses in 140 private high schools and 1,800 public schools to over 37,000 pupils. In 36 of the agricultural colleges opportunities are now offered for students to fit themselves as special teachers of agriculture in secondary school work. They may usually elect courses in general education and agricultural pedagogy, or take a prescribed 4-year course offered for teachers of

agriculture. A few institutions give a course for graduates preparing to teach agriculture.

The vocational agricultural school, with special emphasis on part-time work in agriculture, R. W. SIMMONS (*Yearbook Nat. Soc. Study Ed., 11 (1912), p. 52-54*).—This article discusses and illustrates in detail the work of a vocational agricultural school, as found, for example, in the congressional farm schools of Georgia, the county agricultural schools of Wisconsin, or the state agricultural schools in undivided districts in a number of the States. Special emphasis is directed to the system of part-time work, where the pupil must spend part of the time required for his education in productive farm work, preferably at home, and part at the school, the work at both places being closely correlated and under the direction of the teacher.

A number of projects which might be taken up by such a school are outlined in detail and suggestions given for their proper execution.

State-aided departments of agriculture in public high schools, D. J. CROSBY (*Yearbook Nat. Soc. Study Ed., 11 (1912), pt. 2, pp. 54-65*).—It is noted that Kansas, Louisiana, Maine, Maryland, Massachusetts, Minnesota, New York, North Dakota, Texas, Virginia, and Wisconsin have appropriated funds to encourage the teaching of agriculture in existing public high schools. A number of these have also provided for courses in home economics and farm mechanics. Brief statements are given showing the character and amount of state aid and the requirements to be met in the different States.

It is found that the advantage of state aid over the local initiative system is that it insures better equipment in the way of laboratories, special apparatus, land, etc., and provides better supervision, which can more easily be made expert than where everything concerning courses of study and methods of teaching is left to town or county superintendents. Experts have already been employed by 3 of the States to supervise the work in agricultural instruction.

High school agriculture without state subsidy, W. H. FRENCH (*Yearbook Nat. Soc. Study Ed., 11 (1912), pt. 2, pp. 66-74*).—This paper deals largely with what has been done in agricultural education in those States which have not appropriated special funds or granted special subsidies to individual schools for the introduction of courses in agriculture, home economics, or farm mechanics. It is concluded that this work has already gone far enough to demonstrate that (1) there is an interest on the part of the people in agriculture as a subject of study; (2) agriculture correlates well with other science subjects; (3) intellectual power can be developed through it; (4) the lives of young men are redirected and turned toward agriculture; and (5) practical results in farming processes in the community are secured.

For further advancement of the work it is suggested that a greater interest be awakened in the public mind by extension and demonstration work; that the States grant special subsidies to the schools; and that the state institutions give special attention to the preparation of vocational teachers.

Short courses and extension work for agricultural high schools in the South, H. F. BURTON (*Yearbook Nat. Soc. Study Ed., 11 (1912), pt. 2, pp. 5-42*).—This article describes the extension work of the Agricultural High School at Manassas, Va. Short winter courses lasting 6 to 8 weeks devoted to subjects of local agricultural interest have proved very successful, as have also illustrated lectures and demonstrations given in neighboring rural schools on many phases of agriculture. Interest has been aroused and efforts stimulated for a better and more permanent agriculture in the community.

Short courses and extension work in agriculture for high schools in the North, F. R. CRANE (*Yearbook Nat. Soc. Study Ed., 11 (1912), pt. 2, pp. 3-30*).—This article deals with short courses and extension work in agriculture

in high schools and special secondary agricultural schools in the northern portion of the United States, special reference being made to the agricultural schools of Wisconsin. It describes (1) short courses, including (a) a 10 weeks' course for boys who have had no training for farming, (b) a 2-year short course in dairying, (c) a farmers' lecture course, which includes a 16 weeks' young people's course usually during the winter, (d) a farmers' 1-week school, and (e) institutes and summer tours; (2) extension work, consisting of demonstrations on the individual farm, and the organization of corn testing societies, grain growing associations, and social centers; (3) an information bureau, where the instructor answers personal inquiries, makes seed tests, Babcock tests, etc.; and (4) the distribution of publications.

Practical aid to the school garden movement by the United States Department of Agriculture, SURAN B. SIFE (*Nature-Study Rev.*, 8 (1912), No. 2, pp. 51-53).—A brief account is given of the operations of the Office of Experiment Stations in promoting the theoretical side of the school garden movement, and of the Bureau of Plant Industry in promoting its practical side.

The school garden as a center for the teaching of nature study, R. O. JOHNSON (*Nature-Study Rev.*, 8 (1912), No. 2, pp. 54-61, figs. 4).—The author gives as one of the reasons why the school garden should be made the center for teaching nature study that "the child in the garden (a little world in itself) is placed on a battle ground of opposing natural forces which are identical in kind and behavior with those which he must necessarily meet in his subsequent life." It is also shown that garden work combines the serious and the pleasurable, makes the pupil stronger and more resourceful through the knowledge of his ability to deal with natural forces, furnishes a most potent motive for the learning of the formal lesson in nature study, enlists the interest of parents, furnishes easily accessible material for the nature study lessons, and guarantees a closer relation of nature study with other subjects in the curriculum. Incidentally it teaches a number of exceedingly interesting and profitable lessons, such as respect for the man who works with his hands, a sense of ownership or proprietorship which tends to develop independence, strength, and self-respect, an appreciation of the value of money, cooperation and neighborliness, and habits of neatness and orderliness.

School gardening, a fundamental element in education, B. J. HORCHER (*Nature-Study Rev.*, 8 (1912), No. 2, pp. 62-66, fig. 1).—The author considers that school gardening is fundamental in its relation to the physical and moral development of the child, and that a healthful and natural development will solve the social problems of the nation.

The civic aspect of school gardens, LOUISE K. MILLER (*Nature-Study Rev.*, 8 (1912), No. 2, pp. 74-77, fig. 1).—The author points out that school gardens may become radiating centers of great influence for civic improvement. She refers to the department of school gardens in Cleveland, where there are 107 school gardens of from 1 to 5 acres for normal, backward, defective, blind, crippled, and tubercular children, boys in the detention school for the juvenile court, a kitchen garden for the domestic science class, and a botanic garden. In the schools last winter 60 illustrated lectures were given by the curator of school gardens on various phases of gardening and crop production.

Boys' potato clubs: How to grow the crop and organization, J. C. HOESEN (*Utah Sta. Circ.* 5, pp. 3-15).—Directions are given for growing and handling potatoes and for organizing potato clubs.

Outlines in agriculture and home economics, E. T. FAIRCHILD (*Topeka, Kans.: Dept. Pub. Instr.*, 1911, pp. 35).—The author indicates the necessary equipment, including soil and crop specimens, for instruction in agriculture.

offer suggestions to teachers, and outlines a course of study in agriculture based upon the Elements of Agriculture, by G. F. Warren (E. S. R., 21, p. 494), for class room instruction, and A Unit in Agriculture, by J. D. Eliff (E. S. R., 24, p. 385), for laboratory work. He considers that the subject can be presented satisfactorily in 3 recitation and 2 laboratory periods a week. The laboratory period should be double the class period and should come as the last exercise in the day, thus permitting the class to visit neighboring farms without returning to the school after the class period is over. A list of agricultural texts and reference books is included.

Outlines are also given of courses in home economics, a bibliography for students and teachers, and suggestions concerning equipment.

Syllabus of illustrated lecture on the peanut: Its culture and uses, W. R. HEATIE (U. S. Dept. Agr., Office Expt. Stas. Farmers' Inst. Lecture 13, pp. 23).—In this lecture, prepared for the use of farmers' institute lecturers, the author gives instruction on the soil and its preparation; crop rotation in peanut culture; planting, fertilizing, cultivating, harvesting, and marketing peanuts; varieties of peanuts; uses of peanuts as food, for the production of oil, and as stock feed; and cost of growing peanuts and returns. A list of 50 lantern slides to illustrate the lecture and a list of reference literature are appended.

Syllabus of illustrated lecture on farm home grounds—their planting and care, S. W. FLETCHER (U. S. Dept. Agr., Office Expt. Stas. Farmers' Inst. Lecture 14, pp. 16).—In this lecture, prepared for the purpose of aiding farmers' institute lecturers in the presentation of this subject, the following topics are considered: A house and a home, farm buildings, outbuildings, valuable trees, neatness, what to plant, the lawn, walks, and drives, and what will it cost. A list of 51 lantern slides to illustrate this lecture is appended.

Swine husbandry in Oregon, diversified crop production for the Oregon dry farmer, dairy cows and alfalfa, poultry production, J. WITCOMBE, E. L. PORTER, H. D. SCUDDER, F. L. KENT, and J. DRYDEN (Oregon Sta. Ctr. 18, pp. 5-40, figs. 15).—This circular, dealing in a popular way with the above subjects, was prepared for distribution on the farming demonstration train known as the Hog and Field Pea Special, and operated over the lines of the Oregon and Washington Railroad and Navigation Co., in conjunction with the Oregon College and Station.

MISCELLANEOUS.

Nineteenth and Twentieth Annual Reports of Oklahoma Station, 1910-11 (Oklahoma Sta. Rpts. 1910-11, pp. 230, figs. 61).—This contains the organization list, a report of the director on the work and publications of the station during the year, a financial statement for the fiscal years ended June 30, 1910, and June 30, 1911, brief outlines of work in progress, departmental reports, the experimental work of which is abstracted elsewhere in this issue, and reprints of Bulletins 86 to 92, Circulars 13 and 14, previously noted, Bulletin 93 noted on page 274 of this issue, and of press bulletins entitled The Melon Aphid, Experiments with Winter Wheat, Fall Plowing as a Means of Insect Control, Registration of Live Stock, How to Plant a Tree, The Melon Louse and Disease of Chinch Bug, Broom Corn, The San José Scale, and Alfalfa.

Report of the director for the year ending June 30, 1911, F. B. MUMFORD (Missouri Sta. Bul. 101, pp. 201-236, figs. 2).—This contains the organization list, a report of the director on the work and publications of the station, and a financial statement for the fiscal year ended June 30, 1911.

Index, Bulletins No. 83-96 (Missouri Sta. Index Buls. 83-96, pp. 9).

NOTES.

Alabama College and Station.—F. E. Lloyd, professor of botany and botanist, has been appointed Macdonald professor of botany in McGill University, and will enter upon his new duties September 10.

Arkansas University.—J. N. Tillman has resigned as president.

Colorado Station.—R. S. Herrick, field horticulturist at the Grand Junction substation, has accepted the position of horticulturist in extension work at the Iowa College, and entered upon his new duties August 15.

Illinois University and Station.—A new four-year course in agriculture has been outlined, whereby the first year's work and one-half that of each semester of the second year will be required. The remaining time will be available for specialization in soils, crops, agricultural teaching, horticulture, farm mechanics, dairying, or animal husbandry.

William Dietrich, assistant professor of swine husbandry, has resigned to become superintendent of a stock farm. B. R. Rickards has resigned to engage in commercial work, and will be succeeded as head of the division of municipal and sanitary dairying by H. N. Parker.

Michigan College and Station.—Leo M. Gelsmar, formerly superintendent of the substation at Chatham, has been transferred to extension work in the Upper Peninsula, with headquarters at Marquette.

Nevada University and Station.—L. T. Sharp, formerly connected with the soils laboratory of the California Station, has been appointed to have charge of soil research work in the station and to give instruction in soils in the university.

South Dakota College and Station.—Dr. Edgar W. Olive, professor of botany and botanist, has been appointed curator of the Brooklyn Botanic Garden, to have charge of the department of public instruction and also of work in plant pathology, this becoming effective September 1. C. M. Woodworth, instructor in agronomy; J. C. Hart, also a 1912 graduate, as superintendent of the Chatham of Plant Industry of this Department.

Virginia College and Station.—Press reports announce the resignation of President Barringer, and state that he has been asked to remain until July 1, 1913. Recent appointments include A. W. Drinkard, jr., who has been on leave of absence for two years at Cornell University, as associate horticulturist, beginning October 1; A. N. Hodgson, a 1912 graduate of the college, as assistant in agronomy; J. C. Hart, also a 1912 graduate, as superintendent of the Chatham substation; W. G. Harris as assistant chemist; and George W. Chappellear as assistant in agronomy in the college. T. B. Hutcheson, superintendent of plant work, has been granted leave of absence beginning October 1 to pursue graduate study at Cornell University. William Kerr, assistant animal husbandman, has resigned to engage in practical work.

